BED AIRFLOW AND TEMPERATURE CONTROL

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit of U.S. Provisional Application Serial No. 62/957,103, filed January 03, 2020. The disclosure of the prior application is considered part of (and is incorporated by reference in) the disclosure of this application.

TECHNICAL FIELD

[0002] This document relates to bed systems, and more particularly to devices, systems, and methods for controlling air flow and temperature of a bed.

BACKGROUND

[0003] In general, a bed is a piece of furniture used as a location to sleep or relax. Many modern beds include a soft mattress on a bed frame. The mattress may include springs, foam material, and/or an air chamber to support the weight of one or more occupants. Various features and systems have been used in conjunction with beds, including heating and cooling systems for heating and cooling a user of a bed.

SUMMARY

[0003a] According to a first aspect of the present invention, there is provided a mattress system comprising:

a mattress cover;

a first layer having a top surface and an opposite bottom surface, the top surface covered by the mattress cover, the first layer configured to permit a first airflow rate;

a heating unit arranged above the top surface of the first layer and under the mattress cover, the heating unit being electrically controlled to increase temperature;

an airflow insert pad arranged under the bottom surface of the first layer, and configured to permit a second airflow rate being higher than the first airflow; and

an air controller configured to move air through the airflow insert pad and through the first layer to decrease a temperature at the top surface of the first layer.

[0003b] According to a second aspect of the present invention, there is provided a mattress system comprising:

a mattress cover;

a first foam layer having a top surface and an opposite bottom surface, the top surface covered by the mattress cover, the first foam layer configured to permit a first airflow rate;

a foot warming envelop enclosing a heating unit and arranged under the mattress cover, the heating unit being electrically controlled;

an airflow insert pad arranged under the bottom surface of the first foam layer, and configured to permit a second airflow rate being higher than the first airflow; and

an air controller configured to draw air from the airflow insert pad to increase distribution of air through the first foam layer and decrease a temperature at the top surface of the first foam layer.

[0004] Some embodiments described herein include a bed system with microclimate control capabilities for providing quality sleep experience. The bed system can include a microclimate control subsystem configured to supply conditioned air (e.g., heated or cooled air) to a mattress to achieve a desired temperature at the top of the mattress. In some implementations, conditioned air can be supplied to one or more airflow pads arranged under the mattress top, so that the conditioned air is distributed to the mattress top through the airflow pads. Alternatively, the microclimate control subsystem can draw ambient air from the mattress, thereby conditioning the temperature at the top of the mattress. For example, air is forced to be drawn from the airflow pads so that air at the mattress top is suctioned into the mattress and permits for the air to be circulated and refreshed at the mattress top. Utilizing supply of conditioned air to provide air at desired temperature to the mattress system, or utilizing air suction to drain heat away from the mattress system, can provide precise microclimate control at the mattress, thereby permitting conformable sleep.

WHAT IS CLAIMED IS:

1. A mattress system comprising:

a mattress cover;

a first layer having a top surface and an opposite bottom surface, the top surface covered by the mattress cover, the first layer configured to permit a first airflow rate;

a heating unit arranged above the top surface of the first layer and under the mattress cover, the heating unit being electrically controlled to increase temperature;

an airflow insert pad arranged under the bottom surface of the first layer, and configured to permit a second airflow rate being higher than the first airflow; and

an air controller configured to move air through the airflow insert pad and through the first layer to decrease a temperature at the top surface of the first layer.

2. The mattress system of claim 1, wherein the heating unit includes a foot warming envelop positioned at a foot of the mattress system, and the airflow insert pad is positioned closer to a head of the mattress system than the foot warming envelop.

3. The mattress system of claim 1 or 2, wherein the first layer is configured as a foam layer.

4. The mattress system of any of claims 1-3, wherein the air controller is configured to draw air from the airflow insert pad.

5. The mattress system of any of claims 1-4, wherein the air controller is configured to supply conditioned air to the air insert pad.

6. The mattress system of claim 5, wherein the conditioned air is heated air or~~.~~

~~7. The mattress system of claim 5, wherein the conditioned air is~~ cooled air.

~~8~~7. The mattress system of any of claims 1-~~7~~6, wherein the airflow insert pad includes a pad cover and an airflow material enclosed in the pad cover, the pad cover including a vent, and

wherein the airflow insert pad is arranged for the vent to face the bottom surface of the first layer.

~~9~~8. The mattress system of claim ~~8~~7, wherein the pad cover is made of an air restrictive material, and the vent is covered by a meshed material.

~~10~~9. The mattress system of claim ~~8~~ 7 or ~~9~~8, the vent includes a window provided in the pad cover.

~~11~~10. The mattress system of any of claims 7-9~~8~~ ~~10~~, the vent has edges spaced inward of a perimeter of the airflow insert pad to form a border around the vent.

~~12~~11. The mattress system of any of claims 7-10~~8~~ ~~11~~, further comprising:

an air duct fluidly connected to the airflow insert pad, the air duct including an opening that is connected to a portion of the airflow insert pad that corresponds to the border around the vent.

~~13~~12. The mattress system of any of claims ~~9~~8-~~12~~11, wherein the airflow insert pad is free of holes.

~~14~~13. The mattress system of any of claims 1-~~13~~12, wherein the airflow insert pad is made of Qshion™ material.

~~15~~14. The mattress system of any of claims 1-~~13~~12, wherein the airflow insert pad is made of one of a spacer monofilament material and a reticulated foam.

~~16~~15. The mattress system of any of claims 1-~~13~~12, further comprising:

an inflatable chamber positioned below the first layer.

~~17~~16. The mattress system of claim 1~~5~~6, further comprising:

a foam rail structure including top, bottom, and opposite side form rails extending between the top and bottom foam rails, and configured to surround the inflatable chamber.

~~18~~17. The mattress system of claim ~~17~~16, wherein the rails are attached to the periphery of the first foam layer on the bottom surface.

~~19~~18. The mattress system of claim ~~17~~ 16 or ~~18~~17, further comprising:

a second foam layer (i.e., support foam layer) attached to the bottom surface and including a cutout section configured to receive the airflow insert pad, the airflow insert pad being enclosed in the cutout section and surrounded by the second foam layer such that the airflow insert pad is not laterally exposed.

~~20~~19. The mattress system of claim ~~19~~18, wherein the airflow insert pad is attached to the bottom surface of the first foam layer through the cutout section of the second foam layer.

~~21~~20. The mattress system of claim ~~19~~ 18 or ~~20~~19, wherein the foam rail structure is attached to the second form layer.

~~22~~21. The mattress system of claim ~~21~~20, further comprising:

an air duct extending between the airflow insert pad and the air controller.

~~23~~22. The mattress system of claim ~~22~~21, wherein at least one of the rails has a notch configured to at least partially receive the air duct.

~~24~~23. The mattress system of any of claims ~~17~~16-~~23~~22, further comprising:

one or more reinforcement straps attached to the side rails and extending between the side rails.

~~25~~24. The mattress system of any of claims 1-~~24~~23, further comprising:

an air chamber at least partially surrounded by the rails; and

an air hose extending from the air chamber, the air hose extending at least partially along the duct.

~~26~~25. The mattress system of any of claims ~~22~~21-~~25~~24, further comprising:

a foundation including a duct opening configured to mate with an end of the air duct.

~~27~~26. The mattress system of any of claims ~~22~~21-~~26~~25, further comprising:

a sleeve at least partially disposed around the air duct.

~~28~~27. The mattress system of any of claims 1-~~27~~26, wherein the heating unit comprises a layer positioned at a foot of the mattress system above the first layer and under the mattress cover that is configured to generate heat in response to an electric current, wherein the air controller comprise:

an air controller housing defining a housing inlet and a housing outlet;

a fan positioned in the air controller housing;

an air passage connecting at least one of the housing inlet and the housing outlet of the air controller housing to the airflow insert pad.

~~29~~28. The mattress system of claim ~~28~~27, wherein the air controller further comprises a heater positioned in the air controller housing between the housing inlet and the housing outlet.

~~30~~29. The mattress system of claim ~~28~~ 27 or ~~29~~28, wherein the air passage connects the housing inlet to the airflow insert pad and wherein the air controller is configured to draw air from the airflow insert pad into the air controller housing.

~~31~~30. A method of operating the mattress system of any of claims 1-~~30~~29, the method comprising:

heating via the heating unit; and

cooling via the air controller.

~~32~~31. The method of claim ~~31~~30, and further comprising:

heating a foot portion of the mattress system via the heating unit while cooling a second portion of the mattress system via the air controller.

~~33~~32. The method of claim ~~31~~ 30 or ~~32~~31, and further comprising:

heating a foot portion of the mattress system via the heating unit before a user enters the mattress system;

stopping heating the foot portion of the mattress system via the heating unit either before or when a user is sensed entering the mattress system; and

cooling a second portion of the mattress system via the air controller after a user is sensed entering the mattress system.

~~34~~33. A mattress system comprising:

a mattress cover;

a first foam layer having a top surface and an opposite bottom surface, the top surface covered by the mattress cover, the first foam layer configured to permit a first airflow rate;

a foot warming envelop enclosing a heating unit and arranged under the mattress cover, the heating unit being electrically controlled;

an airflow insert pad arranged under the bottom surface of the first foam layer, and configured to permit a second airflow rate being higher than the first airflow; and

an air controller configured to draw air from the airflow insert pad to increase distribution of air through the first foam layer and decrease a temperature at the top surface of the first foam layer.

~~35. A mattress system comprising:~~

~~a first foam layer configured to permit a first airflow rate;~~

~~an airflow pad arranged under the first foam layer and configured to permit a second airflow rate being higher than the first airflow; and~~

~~an air controller configured to move air through the airflow pad to and through the first foam layer to decrease a temperature at a top surface of the first foam layer,~~

~~wherein the airflow pad is made of a water-resistant, breathable, resilient, and supportive airflow material that is different than the first foam layer.~~

36. The mattress system of claim 35, wherein the airflow material has three-dimensional structures with elastic polyolefin fibers.

37. The mattress system of claim 35 or 36, wherein the airflow material is made of 100% polyolefin.

38. The mattress system of any of claims 35-37, wherein the airflow material includes Qshion™ material.

39. The mattress system of any of claims 35-38, wherein the airflow material has a resilience rate of thickness no less than 95% after 80,000 times of repeated compressions.

40. The mattress system of any of claims 35-39, wherein the airflow pad further includes a pad cover to enclose the airflow material, the pad cover including a vent, and wherein the airflow pad is arranged for the vent to face a bottom surface of the first foam layer.

41. The mattress system of claim 40, wherein the pad cover is made of an air restrictive material, and the vent is covered by a meshed material.

42. The mattress system of claim 41, wherein the airflow pad is free of holes.

43. A mattress system comprising:

a first foam layer positioned proximate a mattress top;

an airflow pad positioned under the first foam layer, wherein the airflow pad includes:

a core of Qshion™ material; and

a plenum chamber substantially surrounding the core of Qshion™ material via a cover material that limits airflow, wherein the cover material is positioned on at least part of a top, a bottom, and sides of the core of Qshion™ material, wherein the plenum chamber defines a top opening, and wherein a mesh material covers the top opening such that air can flow through the top opening;

an air hose connected to the plenum chamber; and

a mattress core configured to support a user positioned under the airflow pad.

44. A mattress comprising:

a first layer having a first layer top and a first layer bottom and extending from a first layer edge to a second layer edge;

a first side rail attached to the first layer bottom proximate the first layer edge;

a second side rail attached to the first layer bottom proximate the second layer edge;

a core positioned under the first layer bottom between the first side rail and the second side rail; and

a first strap connected to the first side rail and the second side rail at a connection locations such that the first strap extends under the core from a bottom of the first side rail to a bottom of the second side rail.

45. The mattress of claim 44, and further comprising:

a mattress cover enclosing the first layer, the first side rail, the second side rail, the core, and the first strap.

46. The mattress of claim 44 or 45, and further comprising:

a second strap connected to the first side rail and the second side rail such that the second strap extends under the core from the first rail bottom to the second rail bottom, wherein the first strap and the second strap are both positioned in a longitudinal middle section of the mattress with the second strap spaced from the first strap.

47. The mattress of any of claims 44-46, and further comprising:

a second strap connected to the first side rail and the second side rail such that the second strap extends under the core from the first rail bottom to the second rail bottom, wherein the first strap crosses the second strap such that the strap is connected to the first side rail between a head of the mattress and the second strap, and wherein the first strap is connected to the second side rail between a foot of the mattress and the second strap.

48. The mattress of any of claims 44-47, and further comprising:

a second strap connected to the first side rail and the second side rail such that the second strap extends under the core from the first rail bottom to the second rail bottom, wherein the first side rail defines a first cutout and the second side rail defines a second cutout such that the first and second side rails are structurally weakened at the first and second cutouts, and wherein the first and second straps connect to the first and second side rails on opposite sides of the first and second cutouts.

49. The mattress of any of claims 44-48, wherein the first side rail defines a first cutout and the second side rail defines a second cutout such that the first and second side rails are structurally weakened at the first and second cutouts, and wherein the first strap is connected to the first and second side rails proximate the first and second cutouts.

50. The mattress of any of claims 44-49, wherein the first layer, the first side rail, and the second side rail comprise one or more foam materials.

51. The mattress of any of claims 44-50, wherein the core comprises an inflatable air chamber.

52. The mattress of any of claims 44-51, wherein the first layer, the first side rail, and the second side rail are part of an upside-down foam tub, wherein the upside-down foam tub further comprises a foot rail and a head rail.

53. The mattress of any of claims 44-52, and further comprising:

a second strap connected to the first side rail and the second side rail such that the second strap extends under the core from the first rail bottom to the second rail bottom;

a first air hose extending through the first side rail between the first strap and the second strap; and

a second air hose extending through the second side rail between the first strap and the second strap.

~~54. A bed comprising:~~

~~a mattress including:~~

~~a first foam layer having a top surface and an opposite bottom surface;~~

~~an inflatable chamber arranged opposite to the top surface of the first foam layer; and~~

~~a foam rail structure including top, bottom, and opposite side form rails extending between the top and bottom foam rails, the foam rail structure extending from a periphery of the first foam layer and configured to surround the inflatable chamber; and~~

~~a plurality of straps, each having opposite ends attached to the opposite side foam rails, respectively, and extending across the inflatable chamber between the opposite side foam rails.~~

~~55. The bed of claim 54, wherein the plurality of straps are arranged to extend between a bottom of the mattress.~~

~~56. The bed of claim 54 or 55, further comprising a foundation configured to support the mattress, wherein the plurality of straps are disposed between a bottom of the mattress and a top of the foundation.~~

~~57. The mattress system of any of claims 54-56, further comprising:~~

~~a plurality of fastening elements configured to attach the plurality of straps onto the opposite side foam rails.~~

~~58. The mattress system of any of claim 57, wherein the plurality of fastening elements includes adhesive tapes applied between the foam rail structure and the ends of the straps.~~

~~59. The mattress system of any of claims 54-58, wherein the foam rail structure includes a notch, and at least one of the plurality of straps is attached to the foam rail structure adjacent the notch.~~

~~60. A bed comprising:~~

a mattress having a mattress top and a mattress bottom defining a mattress interior between the mattress top and the mattress bottom, the mattress including:

a first connection portion positioned on the mattress bottom, the first connection portion being in fluid communication with a first air hole located within the mattress interior and configured to allow air flow therethrough; and

an air hose extending from the first air hole and out from the mattress bottom through the first connection portion; and

a foundation sized and configured to be positioned under the mattress bottom to support the mattress, the foundation including:

a support surface; and

a second connection portion positioned on the support surface, the second connection portion defining a second air hole configured to allow air flow through the second connection portion, wherein the second connection portion is positioned on the foundation at a location configured to align with and connect to the first connection portion when the mattress is positioned on the foundation, and wherein the first air hole is fluidly connected with the second air hole such that air can flow between the foundation and the mattress through the first and second air holes when the first connection portion is connected to the second connection portion.

61. The bed of claim 60, wherein the mattress further comprises:

a mattress cover, wherein the first connection portion comprises a first part positioned on an inside of the mattress cover that connects to a second part positioned on an outside of the mattress cover.

62. The bed of claim 60 or 61, wherein the mattress further comprises:

an inflatable air chamber;

an air distribution layer; and

a second air hose, wherein both the air hose and the second air hoses extend through the first air hole such that the air hose extends to the air distribution layer and the second air hose extends to the inflatable air chamber.

~~63. The bed of any of claims 60-62, wherein the first connection portion connects to the second connection portion via a snap connection.~~

~~64. The bed of any of claims 60-63, wherein the foundation is an adjustable foundation configured to selectively raise and lower a head of the mattress and a foot of the mattress.~~

~~65. The bed of claim 64, wherein the foundation comprises a head panel configured to raise the head of the mattress, a foot panel configured to raise the foot of the mattress, and a middle panel positioned between the head panel and the foot panel, wherein the second connection portion is positioned on the middle panel.~~

~~66. The bed of claim 65, wherein the middle panel remains substantially stationary when the head panel and the foot panel are articulated.~~

~~67. The bed of any of claims 64-66, and further comprising a third connection portion positioned on the mattress bottom defining a third air hole and a fourth connection portion positioned on the support surface defining a fourth hole, wherein the fourth connection portion is positioned on the foundation at a location configured to align with and connect to the third connection portion when the mattress is positioned on the foundation, and wherein the third air hole is aligned with the fourth air hole such that air can flow between the foundation and the mattress through the third and fourth air holes when the third connection portion is connected to the fourth connection portion.~~

~~68. The bed of claim 67, wherein the first, second, third, and fourth connection portions are connected with sufficient strength to hold the mattress to the foundation without any additional connectors between the mattress and the foundation when the foundation raises the head and the foot of the mattress.~~

~~69. The bed of any of claims 60-68, wherein the air hose extends through the first air hole and connects to the second connection portion.~~

~~70. The bed of any of claims 60-69, wherein the second connection portion comprises a hose support potion sized and shaped to extend upward into the first hole and into a first end of the air hose to provide structural rigidity to the air hose when the first connection portion is connected to the second connection portion.~~

~~71. A bed comprising:~~

~~a mattress having a mattress top and a mattress bottom defining a mattress interior between the mattress top and the mattress bottom, the mattress including a first connection portion defining a first air hole positioned at or proximate the mattress bottom; and~~

~~a foundation sized and configured to be positioned under the mattress bottom to support the mattress, the foundation including:~~

~~a support surface; and~~

~~a second connection portion positioned on the support surface, the second connection portion defining a second air hole configured to allow air flow through the second connection portion, wherein the second connection portion is positioned on the foundation at a location configured to align with and connect to the first connection portion when the mattress is positioned on the foundation, wherein the first connection portion is fluidly connected with the second connection portion such that air can flow between the foundation and the mattress through the first and second air holes when the first connection portion is connected to the second connection portion, and wherein the second connection portion comprises a rib extending into the first connection portion to support the first connection portion.~~

~~72. The bed of claim 71, wherein the rib comprises first and second sidewalls extending upward from the second connection portion on opposite sides of the second air hole.~~

~~73. The bed system of claim 71 or 72, wherein the rib comprises a cross wall extending across the second air hole.~~

~~74. A bed comprising:~~

~~a mattress including:~~

a foam layer configured to permit a first airflow rate;

an airflow insert pad arranged under the foam layer and configured to permit a second airflow rate being higher than the first airflow; and

an air duct having first and second ends, the first end being fluidly connected to the airflow insert pad;

a foundation supporting the mattress and including a duct opening;

a duct connector attached around the duct opening of the foundation and configured to fit the second end of the air duct; and

an air controller fluidly connected to the duct opening and configured to draw air from the airflow insert pad through the air duct to increase distribution of air through the foam layer and decrease a temperature at a top surface of the foam layer.

75. The bed of claim 74, wherein the duct connector is arranged adjacent a periphery of the foundation.

76. The bed of claim 74 or 75, wherein the duct connector includes a base fixed to a top surface of the foundation, and a rib extending from the base away from the top surface of the foundation, the rib configured to inserted into the air duct and maintain a width of at least the second end of the air duct when the second end of the air duct is connected to the duct connector.

77. The bed of any of claims 74-76, wherein the duct connector includes a first sub-connector fixed to a top surface of the foundation, and a second sub-connector fixed to a bottom surface of the mattress, the second sub-connector configured to snap to the first sub-connector to position the mattress relative to the foundation.

78. The bed of claim 77, wherein the second sub-connector is configured to slide relative to the first sub-connector to lock the position of the mattress relative to the foundation.

79. A mattress system comprising:

a foam layer configured to permit a first airflow rate;

an airflow insert pad arranged under the foam layer and configured to permit a second airflow rate being higher than the first airflow; and

an air controller configured to draw air from the airflow insert pad and supply heated air to the airflow insert pad, the air controller including:

a housing having a connection-side opening and an ambient-side opening;

a reversible fan mounted in the housing;

a heating element mounted in the housing; and

a control unit configured to control the air controller in a cooling mode in which the reversible fan operates to cause airflow from the connection-side opening to the ambient-side opening through the housing, and further configured to control the air controller in a heating mode in which the heating element is heated and the reversible fan operates to cause air to flow from the ambient-side opening to the connection-side opening, passing through the heating element.

80. The mattress system of claim 79, wherein the air controller further includes:

a first temperature sensor configured to detect a heating element temperature; and

a second temperature sensor configured to detect an outlet temperature of air exiting the housing;

wherein the control unit receives signals from the first and second temperature sensors and controls the heating element based on the signals to achieve a predetermined outlet temperature.

81. The mattress system of claim 79 or 80, wherein the air controller further includes:

a third temperature sensor configured to detect a temperature of the air drawn from the airflow insert pad; and

a fourth temperature sensor configured to detect an ambient temperature,

wherein the control unit receives signals from the third and fourth temperature sensors, and controls the reversible fan based on the signals.

82. The mattress system of claim 81, wherein the control unit calculates an amount of heat extracted from the airflow insert pad based on the signals.

~~83. The mattress system of any of claims 79-82, wherein the air controller further includes:~~

~~one or more humidity sensors;~~

~~wherein the control unit receives signals from the humidity sensors and controls the reversible fan and the heating element based on the signals.~~

~~84. The mattress system of any of claims 79-83, wherein the housing includes a curved conduit between the connection-side opening and the ambient-side opening, and the heating element is arranged at the curved conduit.~~

~~85. The mattress system of claim 84, wherein the heating element is sized to be smaller than a cross-section of the curved conduit.~~

~~86. The mattress system of claim 85, wherein the heating element is arranged closer to an outer corner of the curved conduit than an inner corner of the curved conduit.~~

~~87. The mattress system of any of claims 79-86, wherein the reversible fan is arranged at the ambient-side opening of the housing.~~

~~88. The mattress system of claim 87, wherein the housing includes ribs extending from an inner surface of the housing and configured to engage the reversible fan to secure the reversible fan at the ambient-side opening of the housing.~~

~~89. The mattress system of claim 88, wherein the air controller includes a foam material disposed between the ribs and the reversible fan.~~

~~90. The mattress system of any of claims 79-89, wherein the air controller further includes:~~

~~a first screen arranged at the connection-side opening of the housing; and~~

~~a second screen arranged at the ambient-side opening of the housing.~~

91. The mattress system of any of claims 79-90, wherein the housing includes opposite spacers extending from an inner surface of the housing and configured to interference-fit the heating element therebetween.

92. An air controller configured to be used with a mattress, the air controller comprising:

a housing having a mattress-side opening and an ambient-side opening;

a reversible fan mounted in the housing; and

a heating element that includes a plurality of fins that allow air flow in between the fins to be heated by the heating element, wherein heating element is mounted in the housing in a location that is at least partially spaced from an inner wall of the housing so as to define a bypass flow path that allows air to flow around the heating element while air simultaneously flows through the heating element when air flows from the ambient-side opening toward the mattress-side opening and when air flows from the mattress-side opening to the ambient-side opening.

93. The air controller of claim 92, and further comprising:

a printed circuit board positioned in the housing between the ambient-side opening and the heating element, wherein the reversible fan is positioned in the housing between the ambient-side opening and the heating element, and wherein the printed circuit board is electrically connected to both the reversible fan and the heating element to control operation of the reversible fan and the heating element.

94. A method for controlling a microclimate of a mattress, comprising:

activating a heating element to heat air;

activating a reversible fan in a direction to supply the heated air to a top of the mattress;

controlling the reversible fan in an opposite direction to draw an amount of air from the top of the mattress for a predetermined period time;

detecting a temperature of the amount of air drawn from the top of the mattress; and

activating the heating element and the reversible fan again whereby activation of at least one of the heating element and the reversible fan is adjusted based on the temperature detected.

95. A method for controlling a microclimate of a mattress, comprising:

~~activating a heating element to heat air;~~

~~activating a first fan to supply the heated air to an air layer;~~

~~controlling a second fan to draw an amount of air from the air layer for a predetermined period time;~~

~~detecting a temperature of the amount of air drawn from the air layer; and~~

~~adjusting activation of at least one of the heating element and the first fan based on the temperature.~~

~~96. A method for controlling a microclimate of a mattress, comprising:~~

~~activating a fan to draw air from an air insert pad, wherein the air insert pad is arranged under a top foam layer and configured to permit an airflow rate being higher than an airflow rate of the top foam layer;~~

~~detecting a temperature of the air drawn from the air insert pad; and~~

~~adjusting activation of the fan based on the temperature.~~

~~97. A method for controlling a microclimate of a mattress, comprising:~~

~~activating an air conditioner to condition air;~~

~~supplying the conditioned air to an inlet of an air insert pad, wherein the air insert pad is arranged under a top foam layer and configured to permit an airflow rate being higher than an airflow rate of the top foam layer;~~

~~detecting supply characteristics of air entering the inlet of the air insert pad;~~

~~detecting return characteristics of air exiting an outlet of the air inset pad; and~~

~~adjusting activation of the air conditioner based on the supply characteristics and the return characteristics.~~

~~98. The method of claim 97, wherein supplying the conditioned air includes:~~

~~activating a fan to supply the conditioned air.~~

~~99. The method of claim 98, further comprising:~~

~~adjusting activation of the fan based on the supply characteristics and the return characteristics.~~

~~100. The method of any of claims 97-99, wherein the supply characteristics and the return characteristics include at least one of temperature and humidity.~~

~~101. A method comprising:~~

~~first, supplying air to a mattress over a first extended period to control a microclimate at a top of the mattress;~~

~~second, sampling air temperature at the microclimate over a brief sampling period by reversing airflow to draw air from the mattress to a temperature sensor; and~~

~~third, supplying air to the mattress again over a second extended period whereby air is supplied in a manner different than during the first extended period as a function of the air temperature sampled while airflow was reversed.~~

~~102. The method of claim 101, wherein the first and second extended periods are between 5 and 300 minutes long and wherein the brief sampling period is between 5 and 300 seconds long.~~

~~103. A bed system comprising:~~

~~a mattress;~~

~~a fan assembly configured to cause air to flow from or to the mattress;~~

~~a temperature sensor configured to sense a temperature of the air that flows from or to the mattress; and~~

~~a controller configured to:~~

~~activate the fan assembly to supply air to the mattress over a first extended period to control a microclimate at a top of the mattress;~~

~~activate the fan assembly to reverse airflow to draw air from the mattress for a sampling period of time;~~

~~sample air temperature based on a signal from the temperature sensor, the signal representative of a temperature of the air detected by the temperature sensor; and~~

~~activate the fan assembly to supply air to the mattress again over a second extended period whereby air is supplied in a manner different than during the first extended period as a function of the air temperature sampled while airflow was reversed.~~

~~104. The bed system of claim 103, wherein the temperature sensor is arranged adjacent the fan assembly.~~

~~105. The bed system of claim 103 or 104, wherein the temperature sensor is arranged outside of the mattress.~~

~~106. The bed system of any of claims 103-105, wherein the temperature sensor is arranged in an airflow path between the fan assembly and the mattress.~~

~~107. The bed system of any of claims 103-106, further comprising:~~

~~a humidity sensor configured to detect humidity of the air that flows from or to the mattress, the humidity of the air usable to control an operation of the fan assembly.~~

~~108. A method of operating a mattress air controller, the method comprising:~~

~~flowing air through a housing of the mattress air controller in a first direction from a housing inlet to a housing outlet during a first operation mode configured to condition air at a top of a mattress; and~~

~~reversing flow of air through the housing in a second direction from the housing outlet to the housing inlet during a filter cleaning mode in order to blow particles out of a filter positioned at the housing inlet, wherein the filter cleaning mode has a substantially shorter duration than the first operation mode.~~

~~109. The method of claim 108, the method further comprising:~~

~~sensing user presence on the mattress;~~

~~determining that a user exited the mattress; and~~

~~operating the filter cleaning mode after determining that the user exited the mattress.~~

~~110. The method of claim 108 or 109, wherein the filter cleaning mode is operated daily when a user is not on the mattress.~~

~~111. A method of controlling an air controller configured to draw air from an airflow insert pad for a mattress and supply conditioned air to the airflow insert pad, the method comprising:~~

~~providing the air controller comprising:~~

~~a housing having a connection-side opening and an ambient-side opening, the connection-side opening being in fluid communication with the airflow insert pad, and the ambient-side opening exposed to a surrounding;~~

~~a reversible fan mounted in the housing;~~

~~a heating element mounted in the housing; and~~

~~a filtering unit arranged at the ambient-side opening of the housing;~~

~~controlling the air controller in a cooling mode by operating the reversible fan to cause airflow from the connection-side opening to the ambient-side opening through the housing; and~~

~~controlling the air controller in a cleaning mode by operating the reversible fan to blow air out through the filtering unit at the ambient-side opening of the housing for a predetermined period of time, thereby cleaning the filtering unit.~~

~~112. The method of claim 111, wherein the air controller is configured to perform the cleaning mode periodically.~~

~~113. The method of claim 111 or 112, wherein the air control further comprises:~~

~~a second filtering unit arranged at the connection-side opening of the housing.~~

~~114. The method of any of claims 111-113, further comprising:~~

~~controlling the air controller in a heating mode in which the heating element is heated and the reversible fan operates to cause air to flow from the ambient-side opening to the connection-side opening, passing through the heating element.~~

~~115. A method of controlling an air controller configured to draw air from an air distribution layer for a mattress and supply conditioned air to the air distribution layer, the method comprising:~~

~~providing the air controller comprising:~~

~~a reversible fan; and~~

a heating element;

controlling the air controller in a cooling mode by operating the reversible fan to draw air from the air distribution layer; and

controlling the air controller in a refresh mode by operating the reversible fan to cause air to circulate through the air distribution layer for a predetermined period of time.

116. The method of claim 115, wherein the air controller is controlled in the refresh mode for a predetermined period of time.

117. The method of claim 116, wherein the predetermined period of time ranges from 30 minutes to 60 minutes.

118. The method of any of claims 115-117, further comprising:

sensing user presence on the mattress; and

determining that a user is not present on the mattress prior to controlling the air controller in the refresh mode.

119. The method of any of claims 115-118, further comprising:

detecting a humidity level in the air in the refresh mode; and

operating the air controller in the refresh mode until the humidity level reaches a predetermined value.

120. The method of any of claims 115-119, wherein controlling the air controller in a refresh mode comprises:

controlling the reversible fan to draw air from the air distribution layer for the predetermined period of time.

121. The method of any of claims 115-120, wherein controlling the air controller in a refresh mode comprises:

controlling the reversible fan to supply air to the air distribution layer for the predetermined period of time.

122. The method of any of claims 115-121, further comprising:

flowing air through a HEPA filter during the refresh mode.

123. The method of any of claims 115-122, further comprising:

applying aromatherapy to circulated air during the refresh mode.

124. The method of any of claims 115-123, further comprising:

applying essential oils to air circulated into the mattress during the refresh mode.

125. The method of any of claims 115-124, wherein the mattress includes no materials treated with antimicrobial chemicals and wherein the refresh mode is automatically operated regularly at intervals configured to reduce microbial growth.

126. A method of operating a mattress air controller, the method comprising:

determining that a user is in bed;

operating the mattress air controller to heat or cool the user while the user is determined to be in bed;

determining that the user is not in bed; and

operating the mattress air controller in a refresh mode to refresh air in the mattress while the user is determined to be not in bed.

127. A bed system comprising:

a mattress; and

a mattress air controller comprising:

a fan;

one or more processors; and

a computer-readable storage medium coupled to the one or more processors and having instructions stored thereon which, when executed by the one or more processors, cause the one or more processors to perform operations comprising:

operating the mattress air controller in a conditioning mode whereby the fan is operated to move air at a top of the mattress to heat or cool the user; and

operating the mattress air controller in a refresh mode whereby the fan is operated to move air at the top of the mattress to refresh the mattress.

128. The bed system of claim 127, the operations further comprising:

determining that the user is in bed, wherein the mattress air controller is operated in the conditioning mode while the user is determined to be in bed; and

determining that the user is not in bed, wherein the mattress air controller is operated in the refresh mode while the user is determined to be not in bed.

129. The bed system of claim 128, wherein the mattress air controller further comprises a heater, wherein the heater is operated in the conditioning mode and wherein the heater is not operated in the refresh mode.

130. A method of controlling a microclimate of a mattress, comprising:

determining a sleep cycle of a subject on the mattress;

determining a mode from a plurality of modes based on the sleep cycle, the plurality of modes including a cooling mode in which an air controller is operated to cause ambient air to flow from an airflow insert pad of the mattress, and a heating mode in which the air controller is operated to cause heated air to flow to the airflow insert pad of the mattress; and

controlling the air controller in the determined mode.

131. The method of claim 130, wherein the air controller operates in a first mode in response to one or more processors determining that a user is in stage N1, wherein the air controller operates in a second mode in response to the one or more processors determining that the user is in stage N2, wherein the air controller operates in a third mode in response to the one or more processors determining that the user is in stage N3, and wherein the air controller operates in a fourth mode in response to the one or more processors determining that the user is in REM sleep.

132. A method of controlling a microclimate of a mattress, comprising:

determining a sleep cycle of a subject on the mattress;

determining a mode from a plurality of modes based on the sleep cycle, the plurality of modes including a cooling mode in which an air controller is operated to draw air from a top of the mattress, and a heating mode in which the air controller is operated to blow heated air to a top of the mattress; and

controlling the air controller in the determined mode.

133. The method of claim 130, wherein the air controller operates in a first mode in response to one or more processors determining that a user is in stage N1, wherein the air controller operates in a second mode in response to the one or more processors determining that the user is in stage N2, wherein the air controller operates in a third mode in response to the one or more processors determining that the user is in stage N3, and wherein the air controller operates in a fourth mode in response to the one or more processors determining that the user is in REM sleep.

134. The method of claim 132, wherein the air controller is configured to draw air from the top of the mattress during a first determined sleep stage and the air controller is configured to blow air to the top of the mattress during a second determined sleep stage.

135. A method of controlling a microclimate of a mattress, comprising:

determining a time period of expected user sleep;

sensing whether a user is present on the mattress;

in response to sensing presence during the time period of expected user sleep, flowing air through the mattress in a first operation mode to control microclimate of the mattress while the user is on the mattress;

in response to sensing that the user exited the mattress during the time period of expected user sleep, flowing air through the mattress in a second operation mode that is different than the first operation mode; and

in response to sensing that the user returned to the mattress during the time period of expected user sleep, resuming the first operation mode.

~~136. The method of claim 135, wherein the mattress comprises one or more air distribution layers and one or more air controllers fluidly connected to the one or more air distribution layers.~~

~~137. The method of claim 135 or 136, wherein the mattress comprises a mattress core having one or more air chambers.~~

~~138. The method of claim 137, the method further comprising adjusting air pressure on the one or more air chambers during the second operation mode.~~

~~139. The method of any of claims 135-138, wherein a fan of an air controller is operated during both the first operation mode and the second operation mode, and wherein the fan is operated at a different speed in the first operation mode than in the second operation mode.~~

~~140. The method of any of claims 135-139, wherein a heater of an air controller is operated during both the first operation mode and the second operation mode, and wherein the heater is operated differently in the first operation mode than in the second operation mode.~~

~~141. The method of any of claims 135-140, wherein a heater of an air controller is operated during the first operation mode and not during the second operation mode.~~

~~142. A method of controlling a microclimate of a mattress, comprising:~~

~~sensing whether a user is present on the mattress;~~

~~determining that a user is exited the mattress during a predetermined time period; and~~

~~upon determining that the user exited the mattress during the predetermined time period, initiating activation of an air controller to draw air from an air layer of the mattress to increase distribution of air through a foam layer above the air layer and decrease a temperature at the foam layer.~~

~~143. The method of claim 142, further comprising:~~

~~upon determining the user returns onto the mattress, deactivating the air controller.~~

144. The method of claim 142 or 143, further comprising:

upon determining the user returns the mattress, activating the air controller in a mode of operation that was performed before the user exited the mattress.

145. The method of any of claims 142-144, further comprising:

prior to determining the user exited the mattress, detecting that the user is on the mattress during the predetermined time period.

146. The method of claim 144, wherein the predetermined time ranges from midnight to 6 AM.

147. A bed system comprising:

a mattress having a foam layer and an air layer disposed under the foam layer;

an air controller configured to cause air to flow through the air layer;

a sensor subsystem configured to sense whether a user is present on the mattress; and

a control subsystem configured to:

determine that a user exited the mattress during a predetermined time period; and

upon determining that the user exited the mattress during the predetermined time period, initiate activation of the air controller to draw air from the air layer of the mattress to increase distribution of air through the foam layer above the air layer and decrease a temperature at the foam layer.

148. The system of claim 147, wherein the control subsystem is configured to:

upon determining the user returns the mattress, activate the air controller in a mode of operation that was performed before the user exited the mattress.

149. The system of claim 147 or 148, wherein the control subsystem is configured to:

prior to determining the user exited the mattress, detect that the user is on the mattress during the predetermined time period.

150. A mattress system comprising:

~~a mattress having a first climate control zone and a second climate control zone;~~

~~one or more air controllers in fluid communication with the first and second climate control zones;~~

~~one or more processors; and~~

~~a computer-readable storage medium coupled to the one or more processors having instructions stored thereon which, when executed by the one or more processors, cause the one or more processors to perform operations comprising:~~

~~receiving a command to supply air to the first climate control zone that is heated; and~~

~~in response to receiving the command, commanding the one or more air controllers to supply heated air to the first climate control zone and to supply ambient air to the second climate control zone, wherein a flow rate of ambient air to the second climate control zone is configured to reduce an amount of heat transferred from the first climate control zone to the second climate control zone.~~

~~151. The mattress system of claim 150, wherein the processor commands the one or more air controllers to supply ambient air to the second climate control zone without receiving any user request to supply air to the second climate control zone.~~

~~152. The mattress system of claim 150 or 151, wherein the operations further comprise:~~

~~in response to sensing a user's presence on the second climate control zone, commanding the one or more controllers to stop supplying ambient air to the second climate control zone.~~

~~153. The mattress system of any of claims 150-152, wherein the operations further comprise:~~

~~in response to sensing a user's presence on the second climate control zone, commanding the one or more controllers to reduce supply of ambient air to the second climate control zone.~~

~~154. The mattress system of any of claims 150-153, wherein the operations further comprise:~~

~~in response to sensing a user's presence on the second climate control zone, commanding the one or more controllers to stop supplying heated air to the first climate control zone and to stop supplying ambient air to the second climate control zone.~~

~~155. The mattress system of any of claims 150-154, wherein the operations further comprise:~~

~~in response to sensing a user's presence on the second climate control zone, commanding the one or more controllers to reduce supply of heated air to the first climate control zone and to reduce supply of ambient air to the second climate control zone.~~

~~156. The mattress system of any of claims 150-155, wherein the operations further comprise:~~

~~in response to sensing a user's presence on the first climate control zone, commanding the one or more controllers to stop supplying heated air to the first climate control zone and to stop supplying ambient air to the second climate control zone.~~

~~157. The mattress system of any of claims 150-156, wherein the operations further comprise:~~

~~in response to sensing a user's presence on the first climate control zone, commanding the one or more controllers to reduce supply of heated air to the first climate control zone and to reduce supply of ambient air to the second climate control zone.~~

~~158. The mattress system of any of claims 150-157, wherein the flow rate of ambient air to the second climate control zone is substantially less than a flow rate of heated air to the first climate control zone.~~

~~159. A mattress system comprising:~~

~~a mattress having a first climate control zone, a second climate control zone, a third climate control zone, and a fourth climate control zone;~~

~~one or more air controllers in fluid communication with each of the first, second, third, and fourth climate control zones and configured to independently supply air to or draw air from each of the first, second, third, and fourth climate control zones;~~

~~one or more processors; and~~

~~a computer-readable storage medium coupled to the one or more processors having instructions stored thereon which, when executed by the one or more processors, cause the one or more processors to perform operations comprising:~~

commanding the one or more air controllers to operate in a first mode whereby heated or cooled air is supplied to the first zone while air is simultaneously drawn from the second zone; and

commanding the one or more air controllers to operate in a second mode whereby heated or cooled air is supplied to the third zone while air is simultaneously drawn from the fourth zone.

160. The mattress system of claim 159, wherein the operations further comprise:

commanding the one or more air controllers to operate in a third mode whereby heated air is supplied to the first and third zones while air is simultaneously drawn from the second and fourth zones; and

commanding the one or more air controllers to operate in a fourth mode whereby heated air is supplied to the first zone, cooled air is supplied to the third zone, and air is simultaneously drawn from the second and fourth zones.

161. The mattress system of claim 159 or 160, wherein the first and second zones are on a first side of the mattress for supporting a first user and the third and fourth zones are on a second side of the mattress for supporting a second user.

162. A climate-controlled mattress system comprising:

a mattress core configured to support a user;

an air distribution layer configured to facilitate air flow for climate control of a mattress top surface;

an air hose;

an air controller fluidly connected to the air distribution layer via the air hose; and

a mattress cover that encloses the mattress core, the air distribution layer, and at least part of the air hose, wherein the mattress cover includes a top surface, a bottom surface, and side surfaces, wherein at least a portion of the mattress cover includes fabric with thread having a first heat capacity that is relatively low, and wherein the top surface of the mattress cover includes stitching via a stitching material having a second heat capacity that is relatively high as compared to the first heat capacity.

~~163. The climate-controlled mattress system of claim 162, wherein the stitching material is polypropylene.~~

~~164. The climate-controlled mattress system of claim 162 or 163, wherein the stitching material is nylon.~~

~~165. A climate-controlled mattress system comprising:~~

~~a mattress core configured to support a user;~~

~~an air distribution layer configured to facilitate air flow for climate control of a mattress top surface, wherein the air distribution layer has a first heat capacity;~~

~~an air hose;~~

~~an air controller fluidly connected to the air distribution layer via the air hose; and~~

~~a gel layer positioned proximate the mattress top surface and having a second heat capacity, wherein the second heat capacity is substantially higher than the first heat capacity.~~

~~166. The climate-controlled mattress system of claim 165, and further comprising:~~

~~a foam layer positioned above the air distribution layer and under the gel layer, wherein the foam layer has a third heat capacity that is less than the second heat capacity of the gel layer.~~

~~167. A mattress system comprising:~~

~~a mattress cover layer including a surface with stitches formed of a material having a first heat capacity;~~

~~a foam layer having a top surface and an opposite bottom surface, the top surface covered by the mattress cover, the foam layer configured to permit a first airflow rate, wherein the foam layer is formed of a material having a second heat capacity that is less than the first heat capacity;~~

~~an airflow insert pad arranged under the bottom surface of the first foam layer, and configured to permit a second airflow rate being higher than the first airflow; and~~

an air controller configured to draw air from the airflow insert pad to increase distribution of air through the first foam layer and decrease a temperature at the top surface of the first foam layer.

168. The mattress system of claim 167, wherein the stitches are made with polypropylene threads or nylon threads.

169. The mattress system of claim 167 or 168, wherein the mattress cover layer includes a layer of material having a heat capacity greater than a threshold value.

170. The mattress system of claim 169, wherein the layer of material is a gel.

171. A bed comprising:

a mattress comprising:

an inflatable air chamber;

an air distribution layer positioned above the inflatable air chamber;

a foam layer positioned above the air distribution layer and proximate a top of the mattress, wherein the foam layer and the air distribution layer are both configured to allow airflow therethrough, and wherein the air distribution layer resists air flow less than the foam layer;

a first air hose connected to the inflatable air chamber for inflating the inflatable air chamber; and

a second air hose connected to the air distribution layer for moving air through the air distribution layer, wherein the second air hose extends from a location that is lower than the inflatable air chamber, around a first side of the inflatable air chamber, to the air distribution layer above the inflatable air chamber.

172. The bed of claim 171, wherein the mattress further comprises a mattress cover, and wherein the first and second air hoses enter the mattress through a common hole in the mattress cover.

~~173. The bed of claim 171 or 172, wherein the inflatable air chamber comprises a first inflatable air chamber and the air distribution layer comprises first and second air distribution zones, wherein the first inflatable air chamber is positioned under the first air distribution zone, and wherein the mattress further comprising a second inflatable air chamber positioned under the second air distribution zone.~~

~~174. The bed of claim 173, wherein the mattress further comprises an insulator positioned between the first air chamber and the second air chamber to reduce heat transfer between the first air chamber and the second air chamber.~~

~~175. The bed of claim 173 or 174, wherein the mattress further comprises an insulator positioned between the first and second air chambers and also between the first and second air distribution layers to reduce heat transfer between left and right sides of the mattress.~~

~~176. The bed of any of claims 173-175, wherein the mattress further comprises:~~

~~a third air hose connected to the second inflatable air chamber for inflating the second inflatable air chamber; and~~

~~a fourth air hose connected to the second air distribution layer for moving air through the second air distribution layer, wherein the fourth air hose extends from a second location that is lower than the second inflatable air chamber, around a second side of the second inflatable air chamber, to the second air distribution layer above the second inflatable air chamber.~~

~~177. The bed of any of claims 173-176, wherein the mattress further comprises a mattress cover, and wherein the first and second air hoses enter the mattress through a first common hole in the mattress cover and the third and fourth air hoses enter the mattress through a second common hole in the mattress cover.~~

~~178. The bed of any of claims 173-177, wherein the mattress further comprises:~~

~~a first rail positioned on the first side of the first inflatable air chamber, wherein the first rail defines a first hose passage, and wherein the first and second hoses enter the mattress proximate the first hose passage; and~~

a second rail positioned on the second side of the second inflatable air chamber, wherein the second rail defines a second hose passage, and wherein the third and fourth hoses enter the mattress proximate the second hose passage.

179. The bed of any of claims 173-178, and further comprising:

a foundation having a support platform configured for supporting the mattress and including a first foundation opening extending through the support platform and configured to receive the first and second air hoses;

a pump assembly fluidly connected to an end hose end of the first air hose and configured to supply fluid to the inflatable air chamber, wherein the pump assembly is positioned in the foundation; and

an air controller fluidly connected to the second air hose and configured to move air through the air distribution layer, wherein the air controller is positioned in the foundation.

180. A bed comprising:

a mattress comprising:

a foam layer configured to permit a first airflow rate;

an inflatable chamber arranged under the foam layer;

a hose having first and second hose ends, the first hose end fluidly connected to the inflatable chamber;

a foam rail structure including top, bottom, and opposite side form rails extending between the top and bottom foam rails, and configured to surround the inflatable chamber;

an airflow insert pad arranged under the foam layer and configured to permit a second airflow rate being higher than the first airflow; and

an air duct having first and second duct ends, the first duct end being fluidly connected to the airflow insert pad;

a foundation supporting the mattress and including a duct opening configured to mate with the second duct end of the air duct;

a pump assembly fluidly connected to the second hose end of the hose and configured to supply fluid to the chamber; and

an air controller fluidly connected to the duct opening and configured to draw air from the airflow insert pad through the air duct to increase distribution of air through the foam layer and decrease a temperature at a top surface of the foam layer.

181. The bed of claim 180, wherein the hose is at least partially routed adjacent the air duct.

182. The bed of claim 180 or 181, wherein the airflow insert pad includes a pad cover, and wherein the air duct is fastened to the pad cover at the first duct end to fluidly connect the air duct with the airflow insert pad.

183. The bed of claim 182, wherein the air duct is stitched to the pad cover at the first duct end.

184. The bed of any of claims 180-183, wherein the air duct extending from the airflow insert pad is routed around the chamber.

185. The bed of any of claims 180-184, further comprising:

a duct connector including a base fixed to a top surface of the foundation, and a rib extending from the base away from the top surface of the foundation, the rib configured to be inserted into the air duct and maintain a width of at least the second duct end of the air duct against the hose running adjacent the air duct, when the second duct end of the air duct is connected to the duct connector.

186. The bed of any of claims 180-185, wherein the foam rail structure includes a notch configured to at least partially receive the air duct extending from the airflow insert pad and around the chamber.

187. A mattress comprising:

a mattress core configured to support a user;

an air distribution layer configured to facilitate air flow for climate control of a mattress top surface, wherein the air distribution layer is positioned above the mattress core;

an air hose connected to the air distribution layer;

a mattress cover having a mattress cover top surface, wherein the mattress cover top surface comprises a fabric configured to allow flow of air between the air distribution layer and a space above the mattress top and to resist flow of liquid water into the mattress when the liquid water is positioned on top of the mattress cover top surface.

188. The mattress of claim 187, wherein the fabric substantially prevents flow of liquid water into the mattress at atmospheric pressure.

189. The mattress of claim 187 or 188, wherein the fabric completely prevents flow of liquid water into the mattress at atmospheric pressure.

190. The mattress of any of claims 187-189, wherein the mattress cover has a plurality of mattress cover side surfaces that each comprise one or more second fabrics configured to allow flow of air and flow of water through the one or more second fabrics.

191. The mattress of claim 190, wherein the fabric on the mattress cover top surface is significantly more liquid resistant than the one or more second fabrics on the mattress cover side surfaces.

192. The mattress of any of claims 187-191, wherein the fabric on the mattress cover top surface is water resistant enough to prevent user perspiration from flowing through the fabric into the air distribution layer when air is blown from the air distribution layer through the fabric.

193. The mattress of any of claims 187-192, wherein the fabric on the mattress cover top surface is water resistant enough to prevent user perspiration from flowing through the fabric into the air distribution layer when air is drawn from above the fabric into the air distribution layer.

194. A bed system having a mattress, the bed system comprising:

a first air system configured for controlling pressure of a first air chamber of the mattress;

a second air system configured for conditioning air at a top of the mattress; and

a controller having one or more processors and a computer-readable storage medium coupled to the one or more processors having instructions stored thereon which, when executed by the one or more processors, cause the one or more processors to perform operations comprising:

operating the second air system as a function of data from the first air system.

195. The bed system of claim 194, wherein the first air system comprises a pressure sensor in fluid communication with the first air chamber and configured to sense air pressure and wherein the data comprises the air pressure sensed by the pressure sensor of the first air system.

196. The bed system of claim 194 or 195, wherein the second air system comprises a fan, a heater, and an air distribution layer positioned above the first air chamber.

197. The bed system of any of claims 194-196, wherein the second air system comprises a heater, and wherein the heater is operated as a function of pressure data sensed by the first air system.

198. The bed system of any of claims 194-197, wherein the operations further comprise:

receiving a user input for a desired pressure setpoint of the first air chamber; and

operating the first air system to achieve the desired pressure setpoint,

wherein operating the second air system as a function of data from the first air system comprises operating the second air system to maintain pressure of the first air chamber to a pressure that is near the desired pressure setpoint.

199. The bed system of any of claims 194-198, wherein operating the second air system as a function of data from the first air system comprises operating the second air system to maintain pressure of the first air chamber to a pressure that is near a desired pressure setpoint.

200. The bed system of any of claims 194-199, wherein operating the second air system as a function of data from the first air system comprises operating the second air system to maintain

pressure of the first air chamber to a pressure that is within a tolerance range of a desired pressure setpoint.

201. The bed system of any of claims 194-200, wherein operating the second air system as a function of data from the first air system comprises stopping operation of a heater in response to determining that pressure in the first air chamber is at or has exceeded a threshold.

202. The bed system of any of claims 194-201, wherein the mattress comprises a first layer above the first air chamber, an air distribution layer comprising Qshion™ material above the first layer, a second layer above the air distribution layer, a mattress cover enclosing the first air chamber, the first and second layers, and the air distribution layer, an air hose connected to the first air chamber, and an air duct connected to the air distribution layer.

203. The bed system of any of claims 194-202, wherein the operations further comprise:

determining a desired pressure setpoint and a pressure limit,

wherein operating the second air system as a function of data from the first air system comprises operating at least one of a heater and a fan intermittently in a manner configured to avoid exceeding the pressure limit.

204. A method comprising:

sensing pressure of an air chamber of a mattress; and

controlling operation of an air system as a function of the pressure of the air chamber, wherein the air system comprises an air mover fluidically connected to an air layer that is positioned external to and above the air chamber.

205. The method of claim 204, wherein the air system comprises a fan and a heater, and wherein the heater is operated as the function of the pressure of the air chamber.

206. The method of claim 204 or 205, wherein the air chamber is a first air chamber, and the air system is a first air system, the method further comprising:

~~controlling operation of a second air system as a function of the pressure of the first air chamber.~~

~~207. The method of any of claims 204-206, wherein the air chamber is a first air chamber, and the air system is a first air system, the method further comprising:~~

~~receiving a user input for a desired pressure setpoint of the first air chamber;~~

~~operating the first air system to achieve the desired pressure setpoint; and~~

~~operating a second air system to maintain pressure of the first air chamber to a pressure that is near the desired pressure setpoint.~~

~~208. The method of any of claims 204-207, wherein the air chamber is a first air chamber, and the air system is a first air system, the method further comprising:~~

~~receiving a user input for a desired pressure setpoint of the first air chamber;~~

~~operating the first air system to achieve the desired pressure setpoint; and~~

~~operating the second air system to maintain pressure of the first air chamber to a pressure that is within a tolerance range of a desired pressure setpoint.~~

~~209. A bed system having a mattress, the bed system comprising:~~

~~a first air system configured for controlling pressure of a first air chamber of the mattress;~~

~~a second air system configured for conditioning air at a top of the mattress; and~~

~~a controller having one or more processors and a computer-readable storage medium coupled to the one or more processors having instructions stored thereon which, when executed by the one or more processors, cause the one or more processors to perform operations comprising:~~

~~monitoring a temperature of air supplied from the second air system;~~

~~detecting presence of a user on the mattress; and~~

~~generating a signal usable by the second air system to change the temperature of air supplied from the second air system by an offset value, the offset value configured to achieve no or limited deviation from a set point of the pressure of the first air chamber of the mattress.~~

~~210. The bed system of claim 209, wherein detecting presence of a user on the mattress comprising:~~

~~monitoring a pressure of the first air chamber of the mattress; and~~

~~detecting a change in the pressure of the first air chamber.~~

~~211. A method comprising:~~

~~monitoring a temperature of air supplied from the second air system;~~

~~detecting presence of a user on the mattress; and~~

~~changing the temperature of air supplied from the second air system by an offset value, the offset value configured to achieve no or limited deviation from a set point of the pressure of the first air chamber of the mattress.~~

~~212. The method of claim 211, wherein changing the temperature of air comprises:~~

~~changing the temperature of air by the offset value in a single step.~~

~~213. The method of claim 211 or 212, wherein changing the temperature of air comprises:~~

~~changing the temperature of air by the offset value in multiple steps.~~

~~214. The method of any of claims 211-213, wherein changing the temperature of air comprises:~~

~~changing the temperature of air by the offset value gradually.~~

~~215. A bed system having a mattress, the bed system comprising:~~

~~a first air system configured for controlling pressure of a first air chamber of the mattress;~~

~~a second air system configured for conditioning air at a top of the mattress; and~~

~~a controller having one or more processors and a computer-readable storage medium coupled to the one or more processors having instructions stored thereon which, when executed by the one or more processors, cause the one or more processors to perform operations comprising:~~

~~detecting presence of a user on the mattress;~~

~~determining an expected temperature offset relating to user presence;~~

when the user is not detected on the mattress, operating the second air system in a first mode to control temperature at the top of the mattress; and

when the user is detected on the mattress, operating the second air system in a second mode to control temperature at the top of the mattress, wherein the second mode differs from the first mode at least because the second mode is adjusted according to the expected temperature offset relating to user presence.

216. The bed system of claim 215, wherein the first air system comprises a pressure sensor in fluid communication with the first air chamber and configured to sense air pressure and wherein the presence of the user is detected by the pressure sensor of the first air system.

217. The bed system of claim 215 or 216, wherein the second air system comprises a fan, a heater, and an air distribution layer positioned above the first air chamber.

218. The bed system of any of claims 215-217, wherein the second air system comprises a heater, and wherein the heater is operated less in the second mode than in the first mode as a function of the expected temperature offset relating to user presence.

219. The bed system of any of claims 215-218, wherein the second air system comprises a fan, and wherein the fan is operated less in the second mode than in the first mode as a function of the expected temperature offset relating to user presence.

220. The bed system of any of claims 215-219, wherein the mattress comprises a first layer above the first air chamber, an air distribution layer comprising Qshion™ material above the first layer, a second layer above the air distribution layer, a mattress cover enclosing the first air chamber, the first and second layers, and the air distribution layer, an air hose connected to the first air chamber, and an air duct connected to the air distribution layer.

221. The bed system of any of claims 215-220, wherein the operations further comprise:

determining a desired pressure setpoint and a pressure limit,

wherein operating the second air system in the second mode comprises operating at least one of a heater and a fan in a manner configured to avoid exceeding the pressure limit while considering the expected temperature offset relating to user presence.

222. The bed system of any of claims 215-221, wherein the second air system comprises a fan, and wherein the fan is operated more in the second mode than in the first mode as a function of the expected temperature offset relating to user presence.

223. The bed system of any of claims 215-222, wherein the operations further comprise:

determining a desired pressure setpoint and a pressure limit,

wherein operating the second air system in the second mode comprises adjusting an intermittent operation frequency or duration of at least one of a heater and a fan as a function of the expected temperature offset relating to user presence.

224. A bed system having a mattress, the bed system comprising:

a first system configured to consume power;

a second air system configured for conditioning air at a top of the mattress; and

a controller having one or more processors and a computer-readable storage medium coupled to the one or more processors having instructions stored thereon which, when executed by the one or more processors, cause the one or more processors to perform operations comprising:

monitoring power consumption by the second air system;

calculating energy costs by the second air system; and

displaying the power consumption and the energy costs of the second air system.

225. The bed system of claim 224, wherein monitoring power consumption comprises:

detecting voltage and/or current used in the second air system; and

calculating the power consumption based on the voltage and/or current detected.

226. The bed system of claim 224 or 225, wherein the operations further comprise:

monitoring power consumption by the first system;

calculating energy costs by the first system; and

displaying the power consumption and the energy costs of the first system.

227. The bed system of claim 226, wherein the first system is a first air system for controlling air pressure of a first air chamber of the mattress.

228. The bed system of any of claims 224-227, and further comprising:

a third bed articulation control system.

229. The bed system of claim 228, wherein the operations further comprise:

monitoring power consumption by the third bed articulation control system;

calculating energy costs by the third bed articulation control system; and

displaying the power consumption and the energy costs of the third bed articulation control system.

230. The bed system of claim 228 or 229, wherein the operations further comprise:

displaying the power consumption and the energy costs of the bed system.

231. The bed system of any of claims 224-230, wherein the operations further comprise:

receiving information regarding the cost of energy from a utility provider, wherein the energy costs are calculated as a function of the cost of energy.

232. A bed system having a mattress, the bed system comprising:

an air system configured for conditioning air at a top of the mattress; and

a controller having one or more processors and a computer-readable storage medium coupled to the one or more processors having instructions stored thereon which, when executed by the one or more processors, cause the one or more processors to perform operations comprising:

monitoring power consumption by the air system;

controlling the air system as a function of the power consumption; and

displaying an indication of the power consumption.

~~233. The bed system of claim 232, wherein the air system is controlled as a function of the power consumption to prevent causing fire.~~

~~234. The bed system of claim 232 or 233, wherein the operations further comprise:~~

~~sending a power consumption signal over the internet that indicates the power consumption of the air system.~~

~~235. The bed system of any of claims 232-234, wherein the indication of power consumption comprises a total cost of energy consumed during a single sleep session.~~

~~236. The bed system of any of claims 232-235, wherein the total cost of energy consumed during the single sleep session is calculated as a function of the power consumption for the single sleep session and cost of energy.~~

~~237. The bed system of any of claims 232-236, wherein the operations further comprise:~~

~~displaying an indication of cost savings by using the air system in lieu of using a second system.~~

~~238. The bed system of any of claims 232-237, wherein the second system is a whole home system configured for at least heating or air conditioning.~~

~~239. The bed system of any of claims 232-238, wherein the operations further comprise:~~

~~sending a signal to a second system to control the second system as a function of the power consumption by the air system.~~