US 20110061840A1

(19) United States

(12) Patent Application Publication

(10) Pub. No.: US 2011/0061840 A1

(43) Pub. Date: Mar. 17, 2011

Goldmann et al.

(54) **APPARATUS FOR COOLING AN EXERCISER HAVING CONVENIENT CENTRALIZED CONTROL OF AIR OUTLETS BUILT INTO A STATIONARY EXERCISE DEVICE**

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(21) Appl. No.: **12/952,113**

(22) Filed: **Nov. 22, 2010**

Related U.S. Application Data

(63) Continuation-in-part of application No. 12/001,003, filed on Dec. 7, 2007.

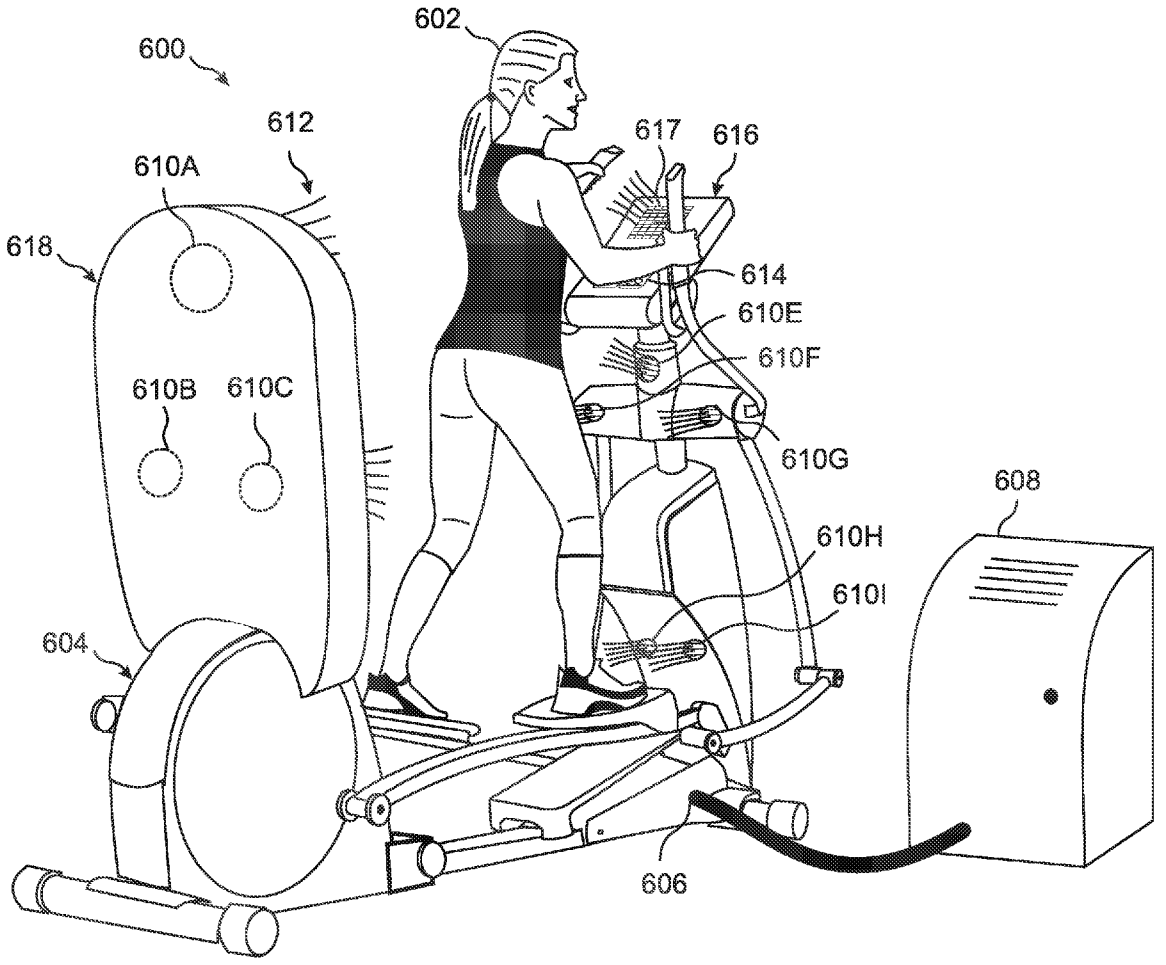
Publication Classification

(51) **Int. Cl.**
F28F 13/12 (2006.01)

(52) **U.S. Cl.** **165/104.34**

(57) **ABSTRACT**

An apparatus for convenient centralized control of a personal cooling environment of an exerciser by the exerciser while exercising includes a plurality of air outlets and a control center. Each air outlet is capable of being in airflow communication with a cooling air source providing a flow of cooling air. The plurality of air outlets are arranged so as to direct cooling air toward the exerciser to create a personal cooling environment for the exerciser. At least one air outlet is adjustable in response to a control signal. The control center is easily accessible to the exerciser while exercising and generates control signals in response to input from the exerciser. The control signals cause at least one air outlet to change a characteristic of the cooling air flow therethrough. Together, the control signals control the personal cooling environment. The controllable air flow characteristics include one of flow direction and rate.



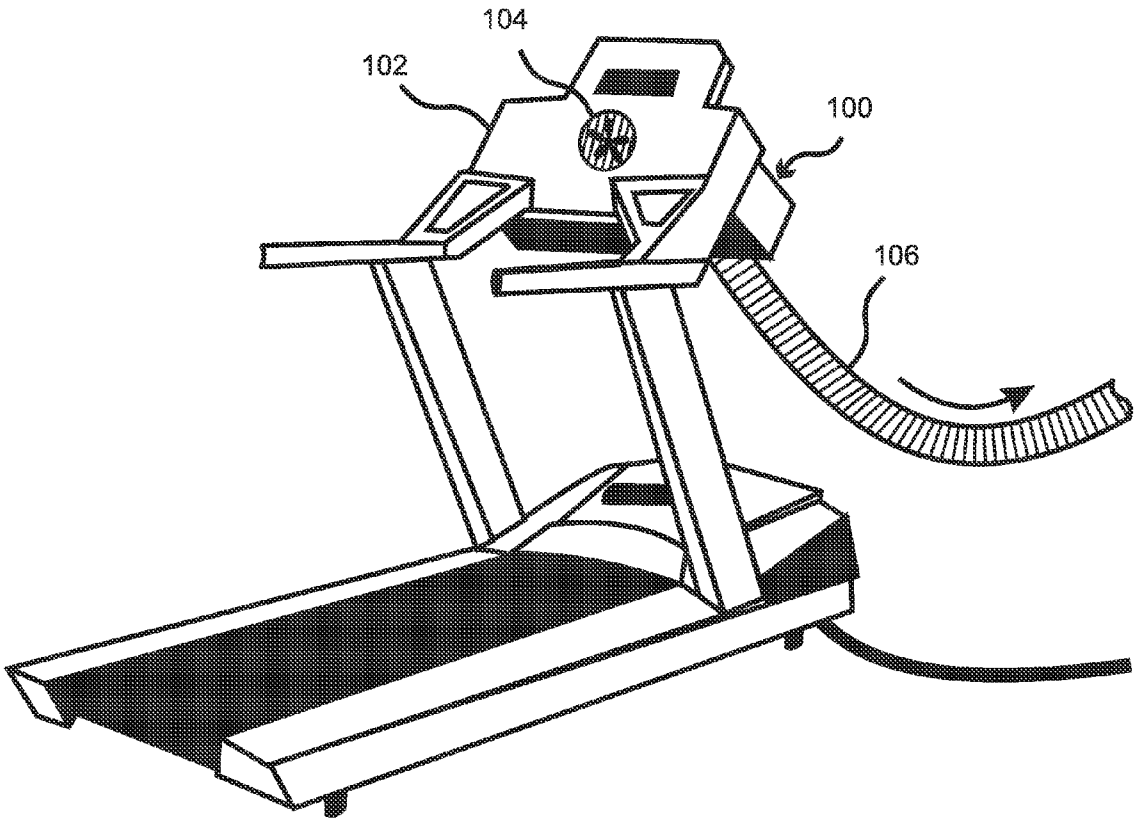


Figure 1

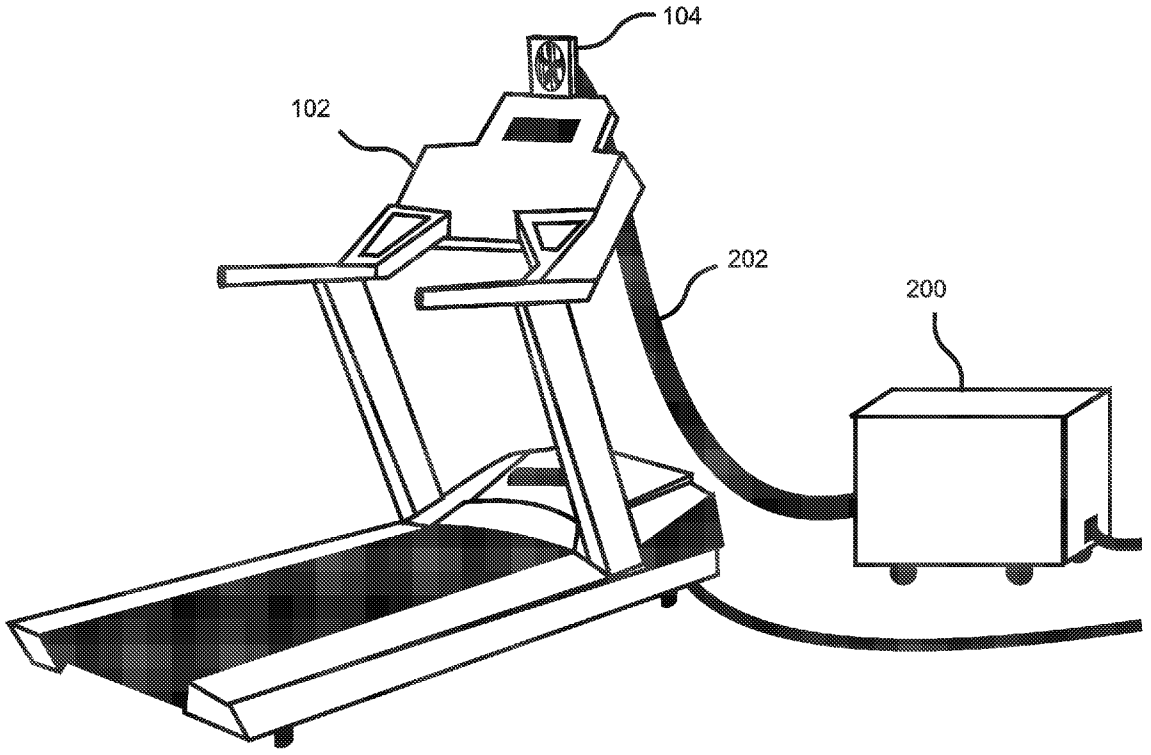


Figure 2A

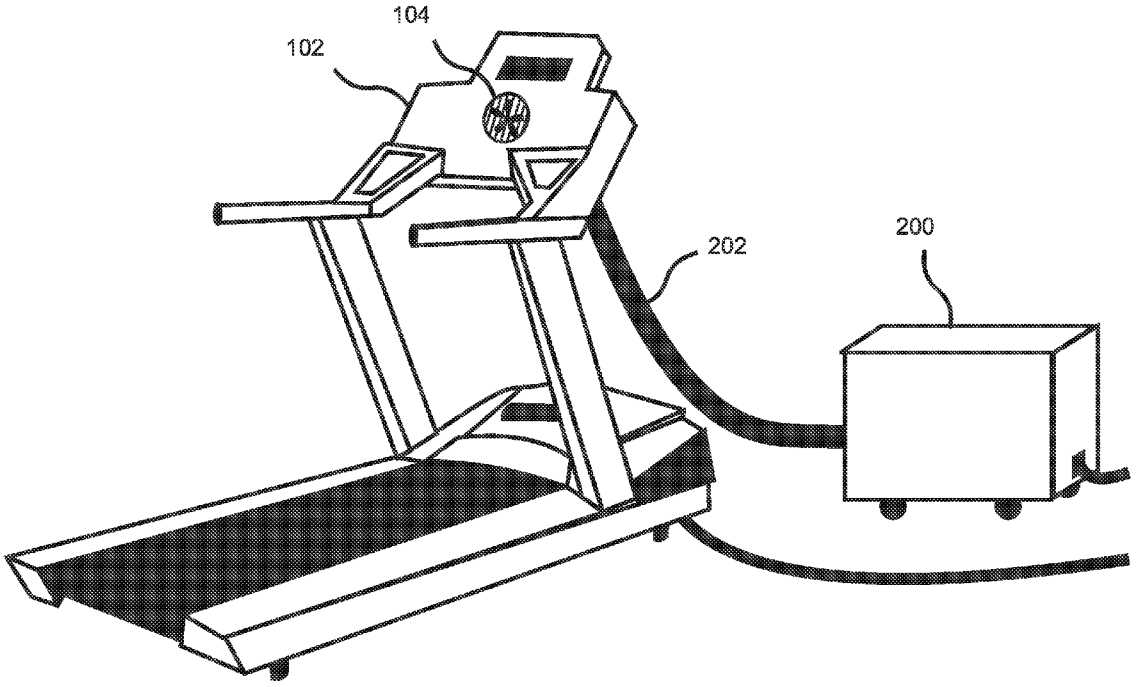


Figure 2B

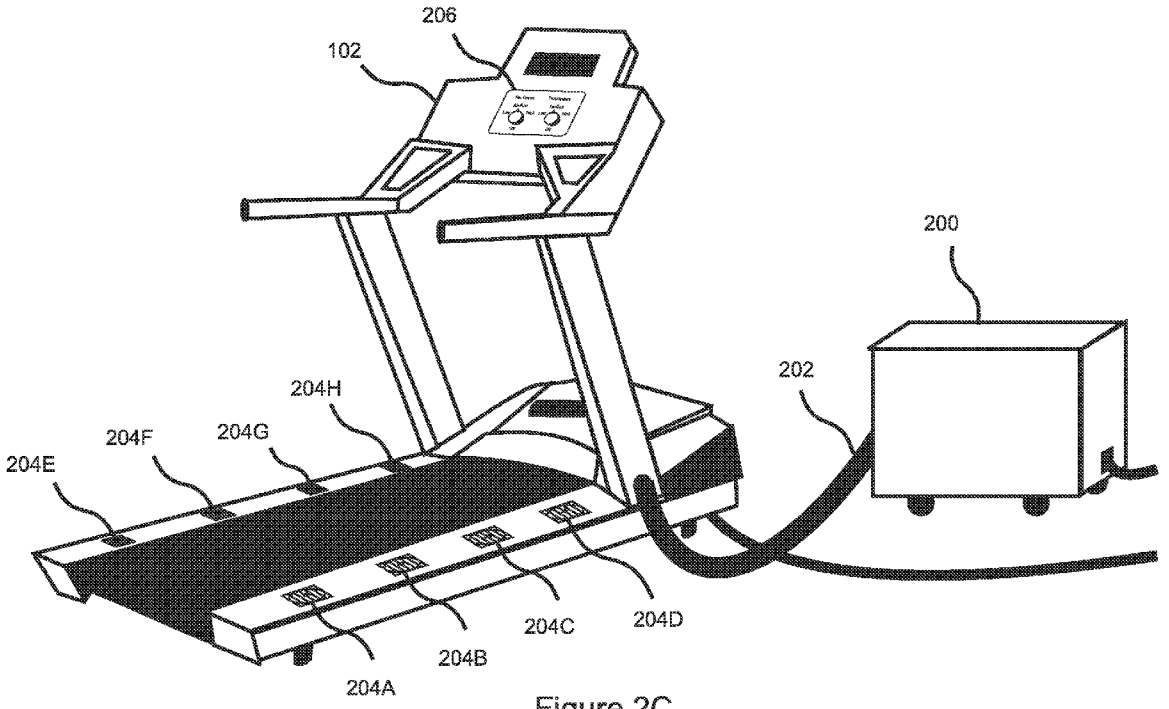


Figure 2C

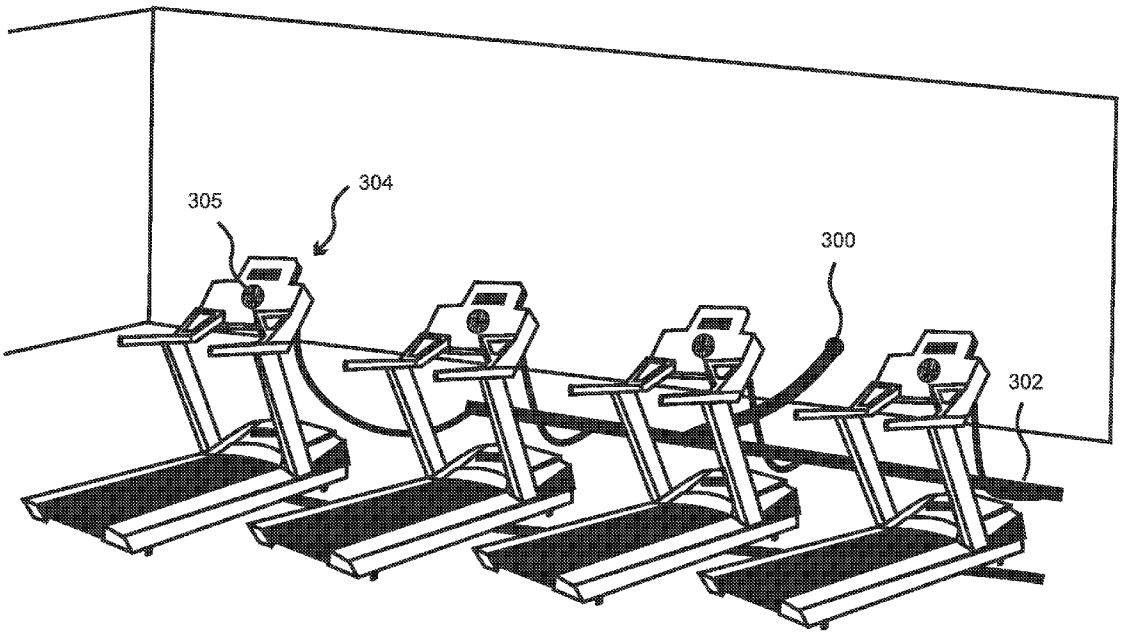


Figure 3

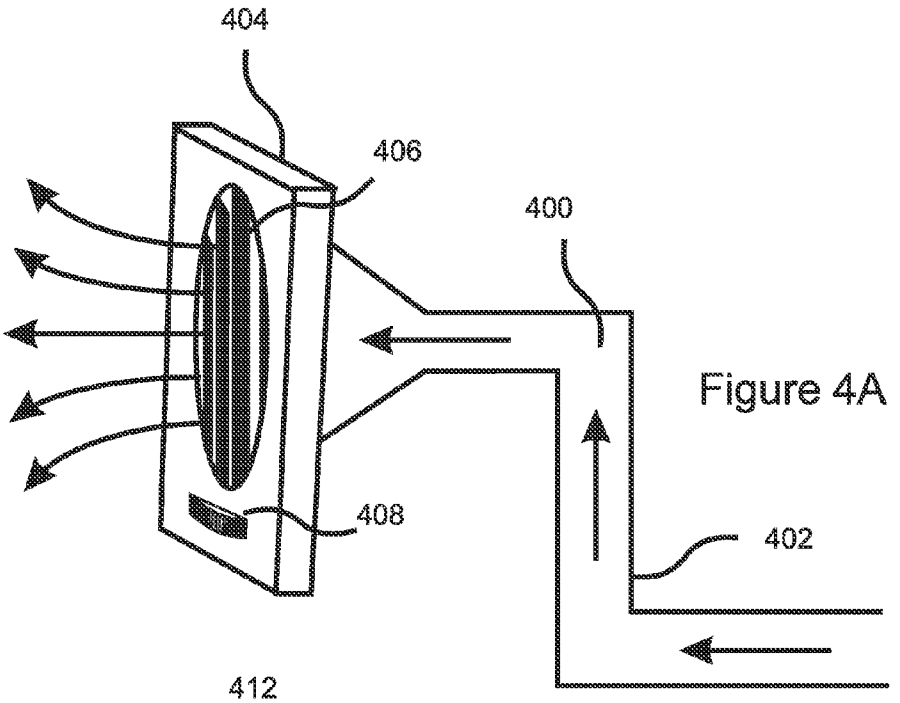


Figure 4A

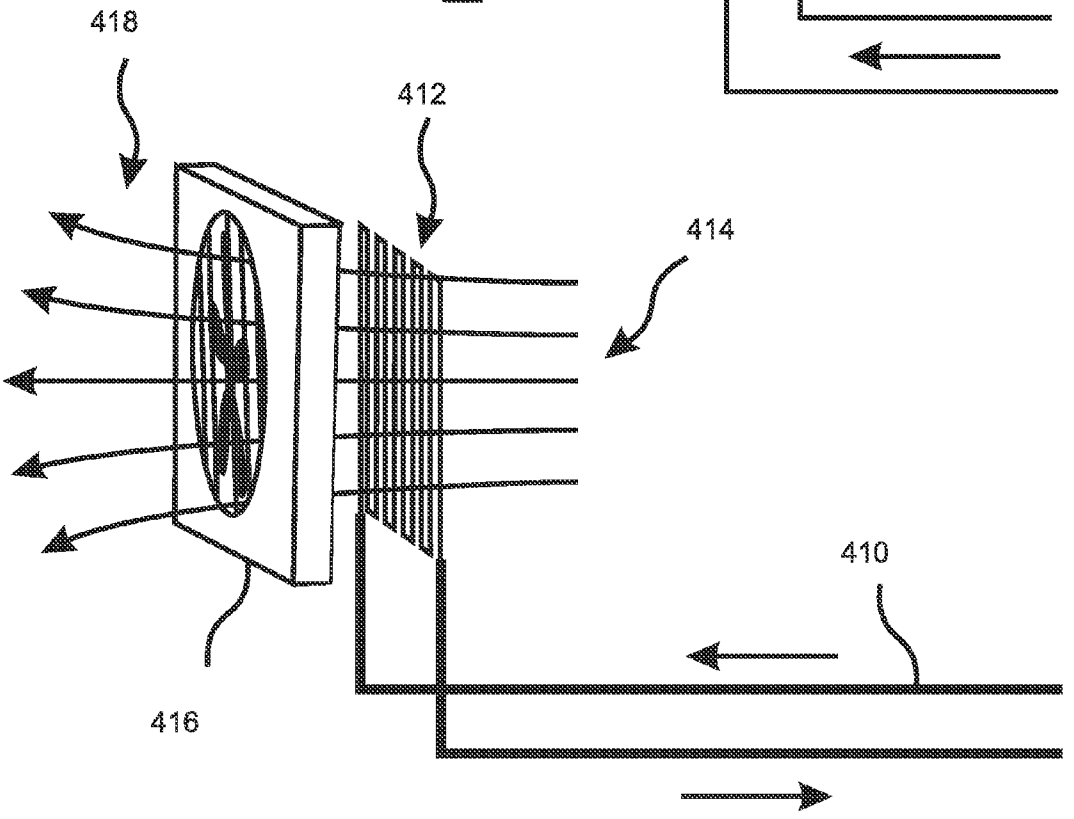


Figure 4B

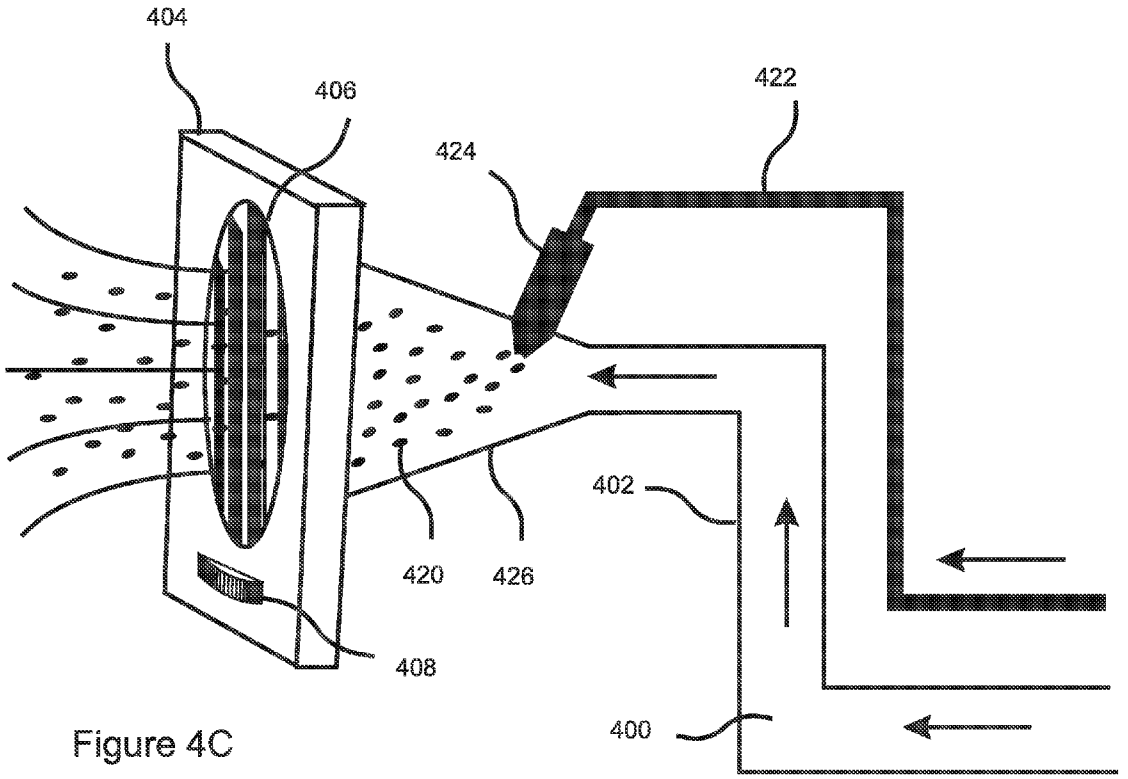


Figure 4C

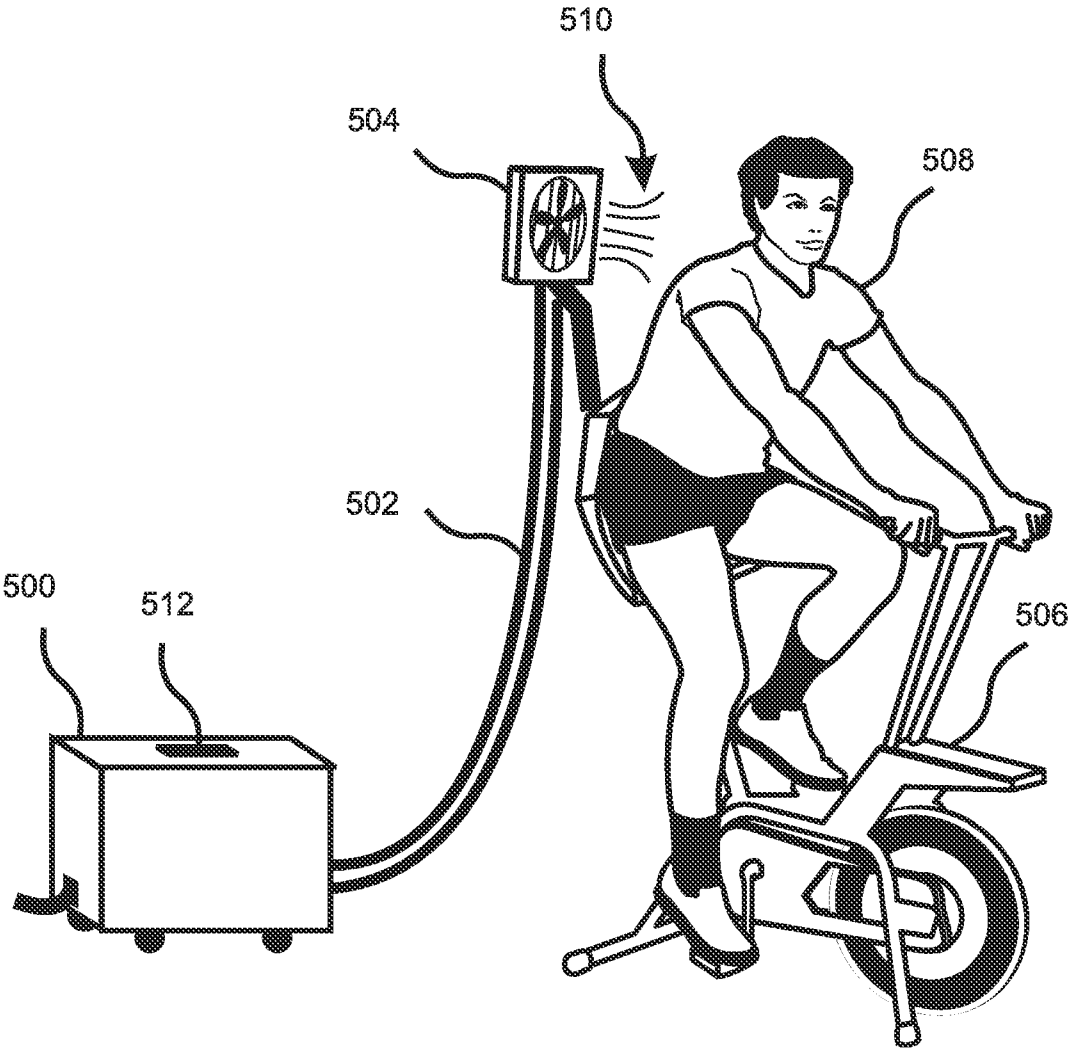


Figure 5A

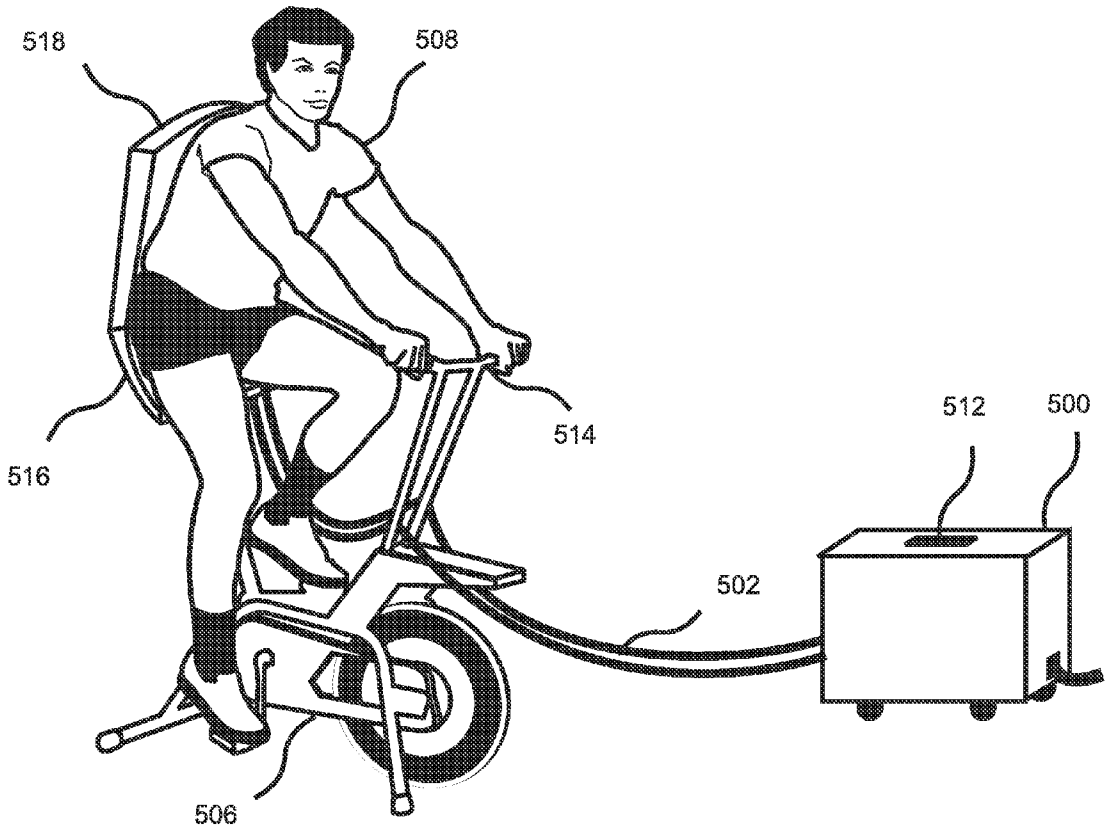


Figure 5B

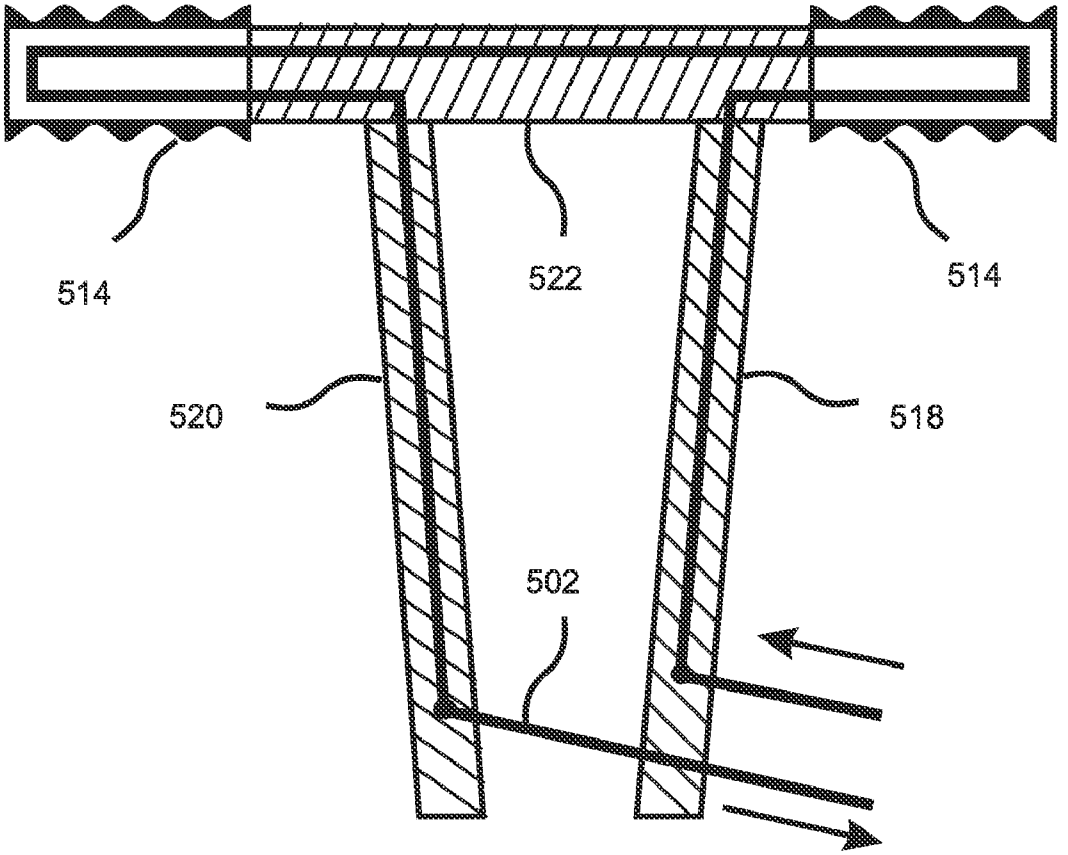


Figure 5C

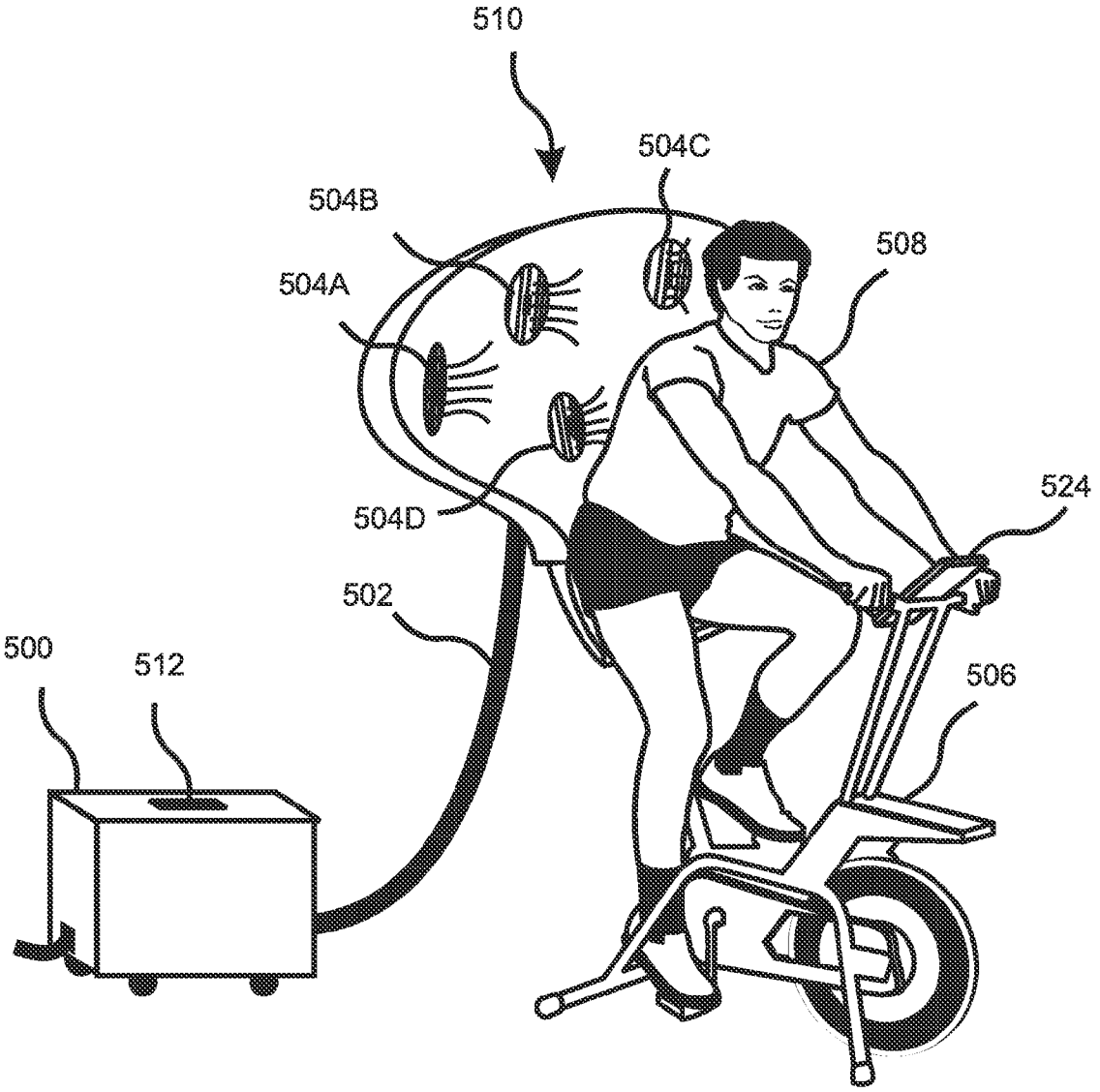
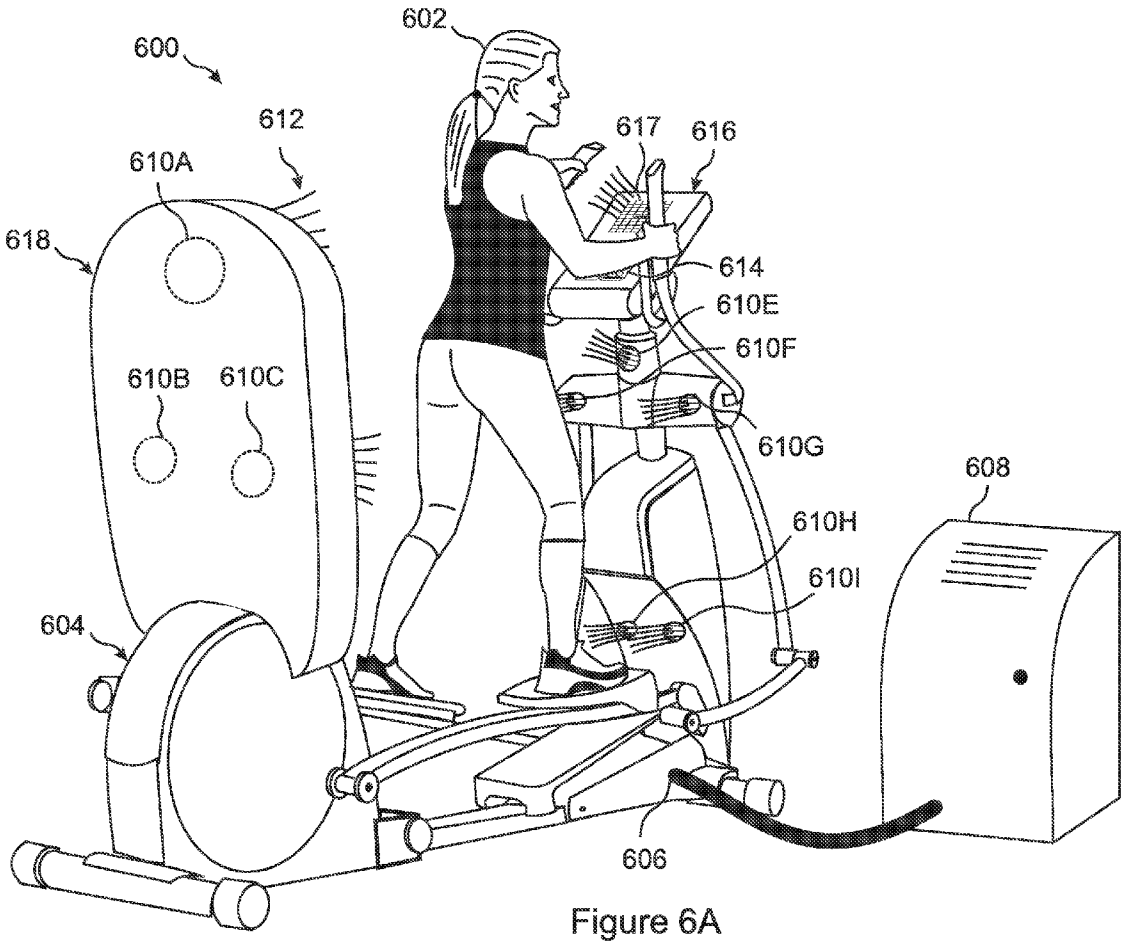


Figure 5D


600
602
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606

Figure 6A

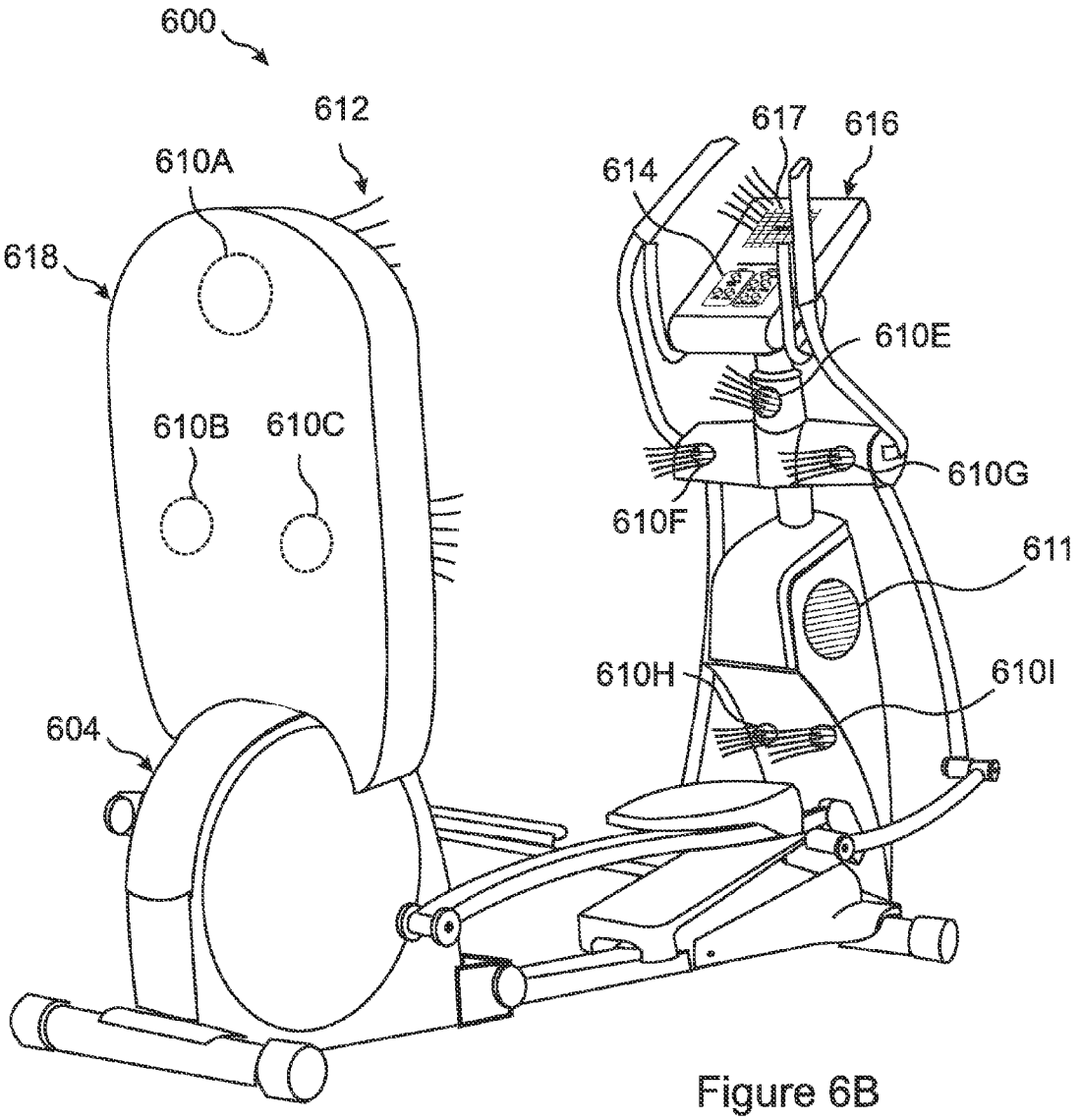
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Figure 6B

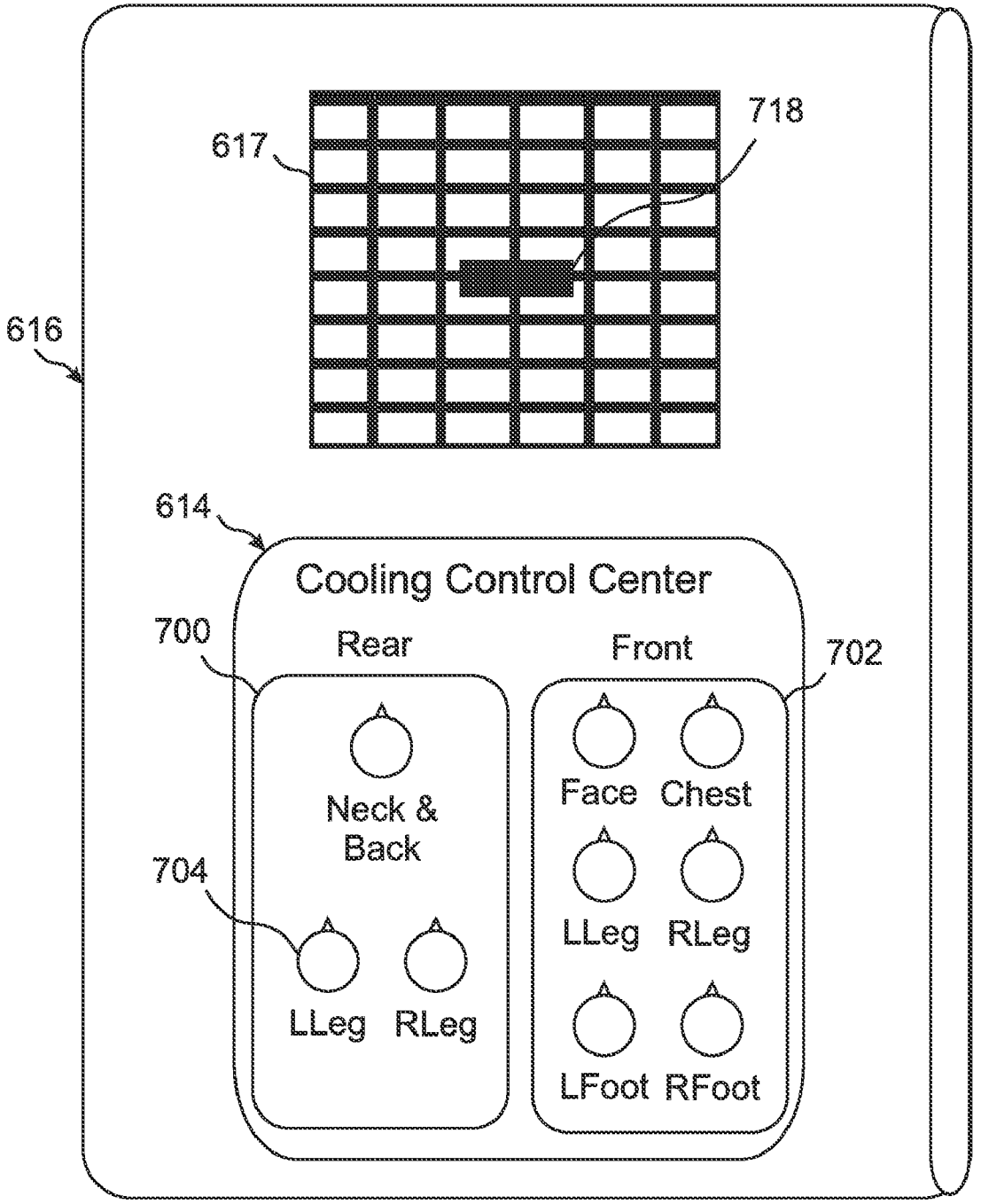

616
617
718
614
Cooling Control Center
700
Rear
Front
702
Neck &
Back
704
LLeg
RLeg
Face
Chest
LLeg
RLeg
LFoot
RFoot

Figure 7A

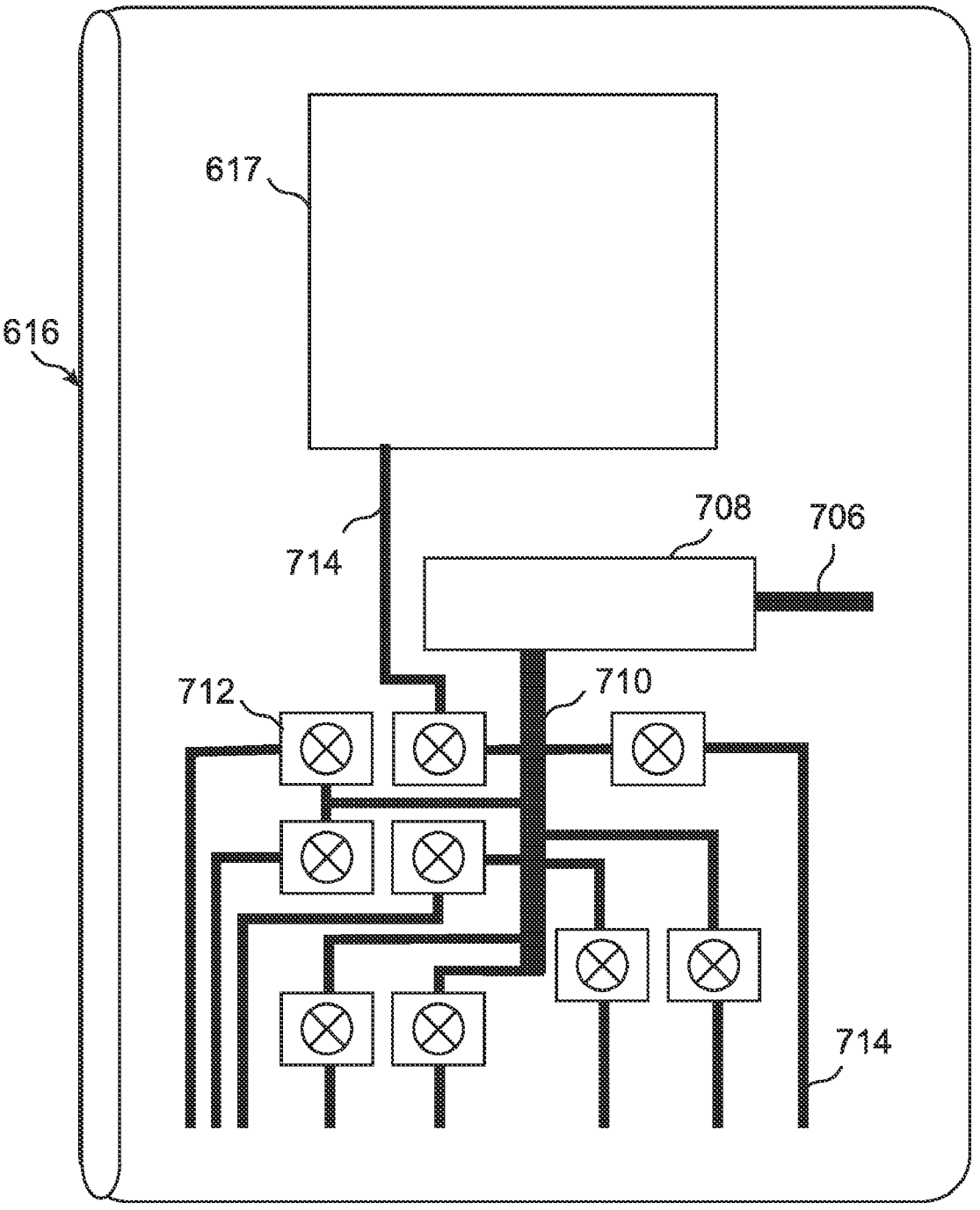


Figure 7B

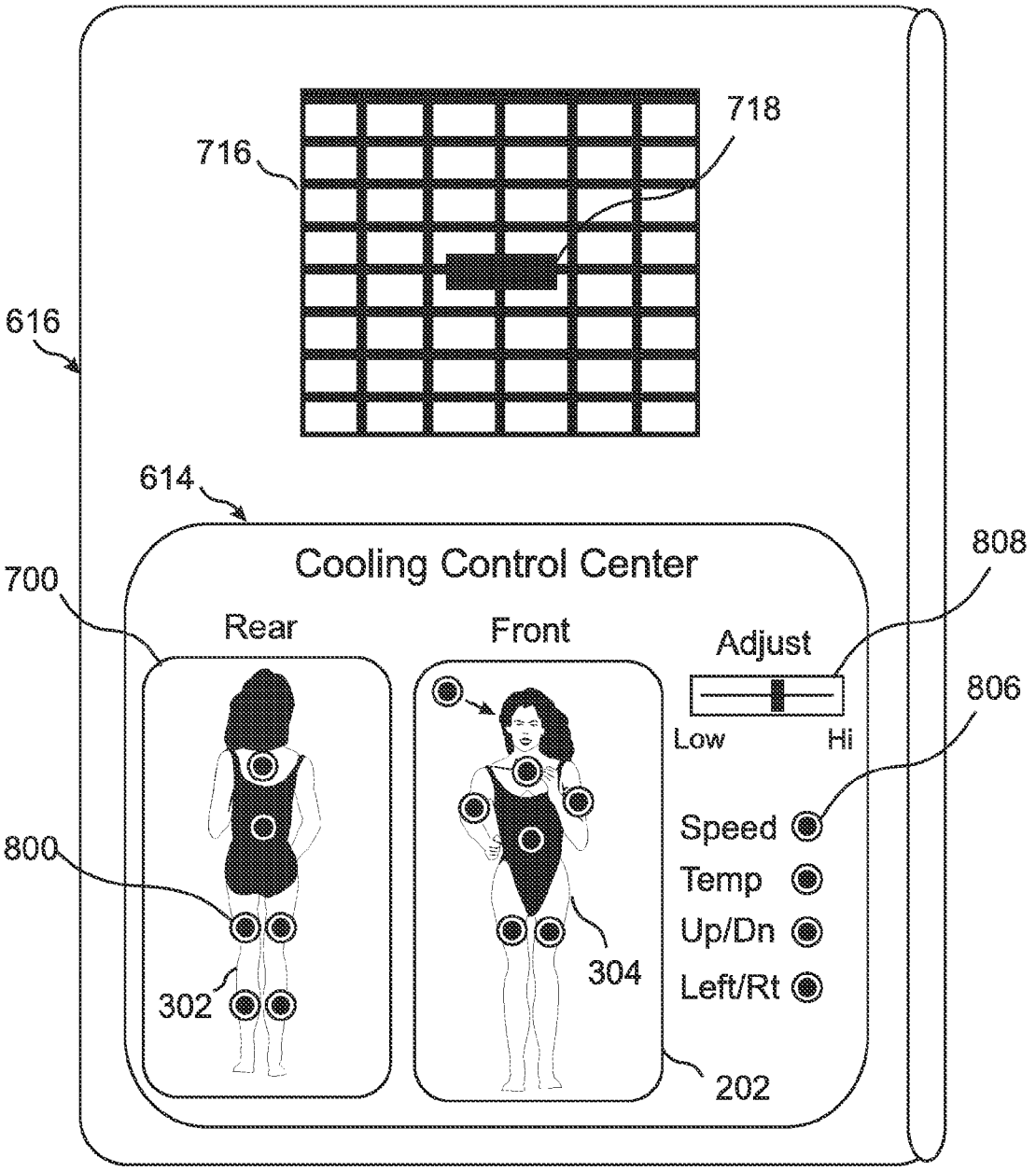

718
716
616
614
Cooling Control Center
700
808
Rear
Front
Adjust
806
Low
Hi
Speed
Temp
Up/Dn
Left/Rt
800
304
302
202

Figure 8

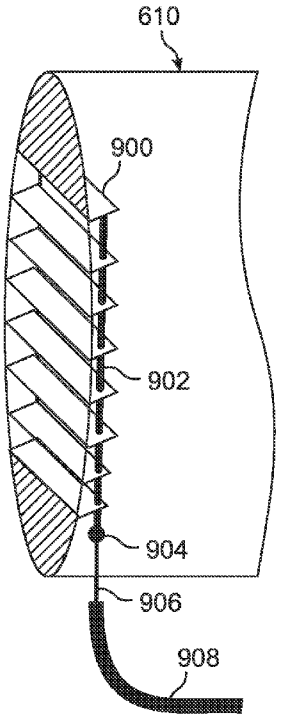


Figure 9A

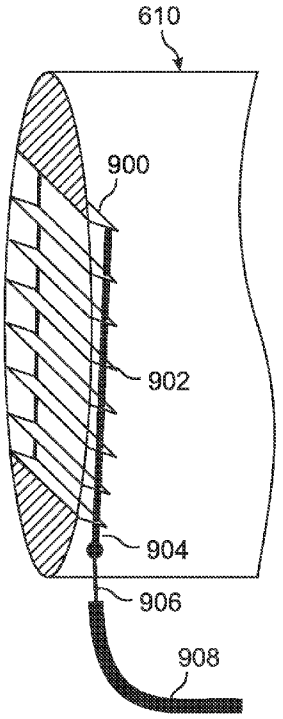


Figure 9B

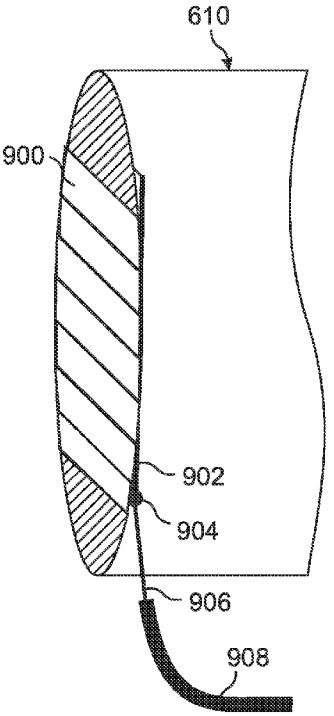


Figure 9C

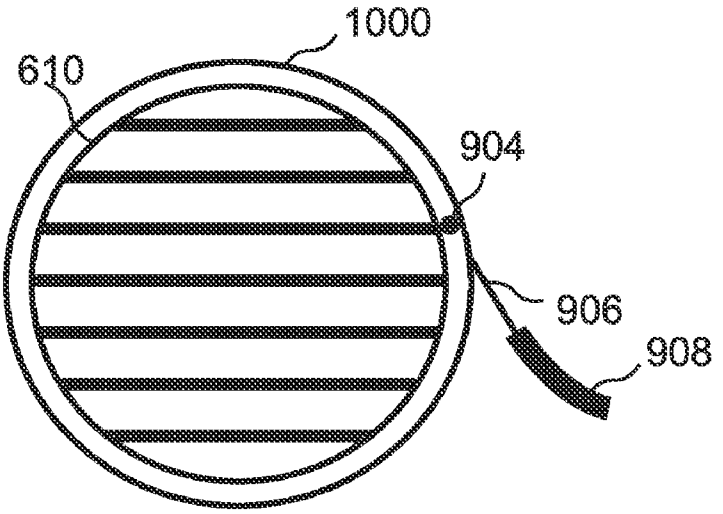


Figure 10A

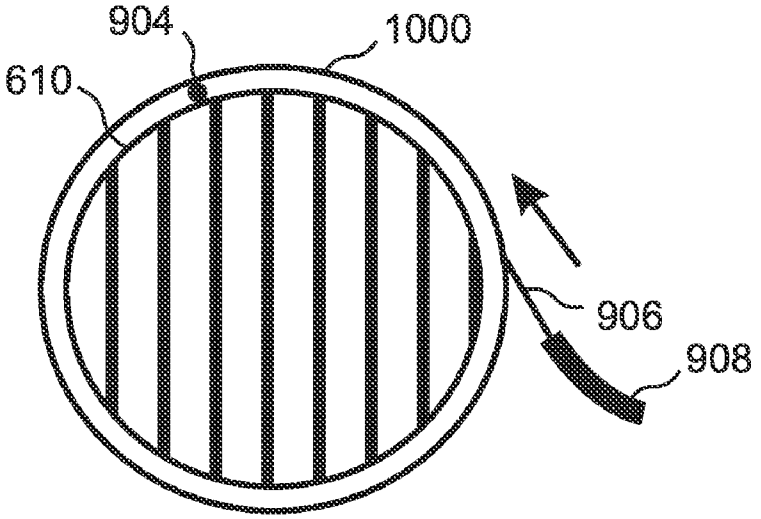


Figure 10B

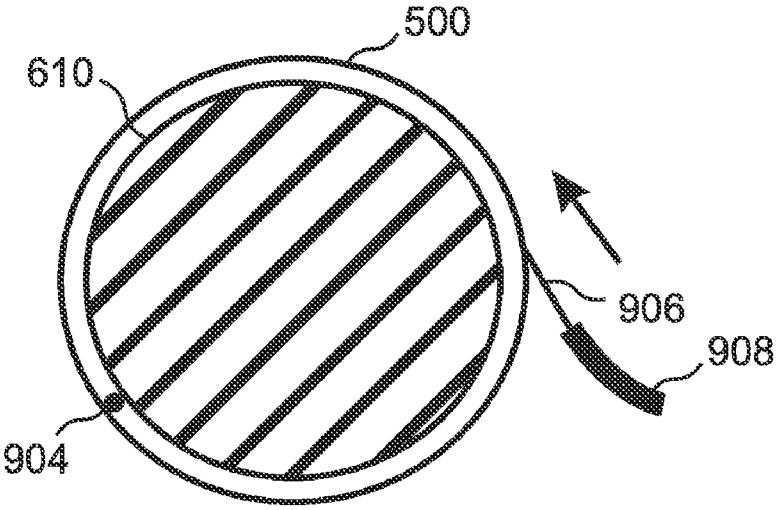


Figure 10C

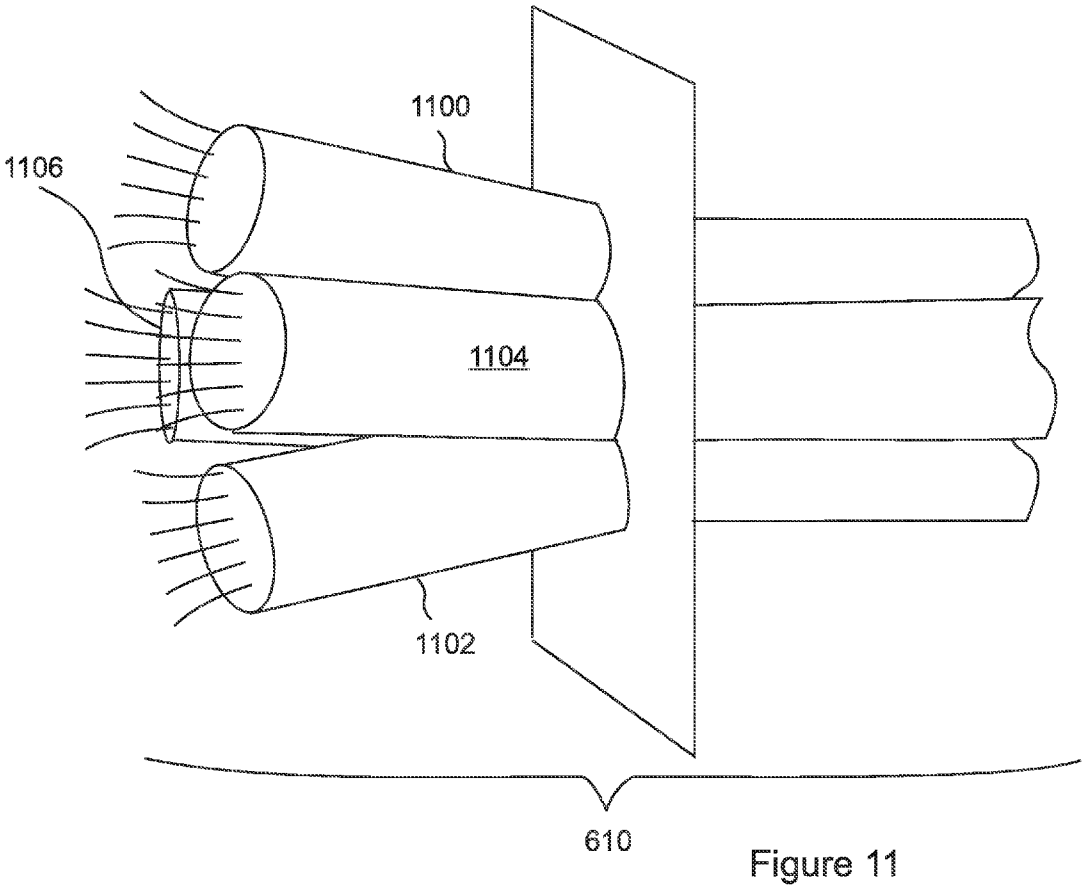


Figure 11

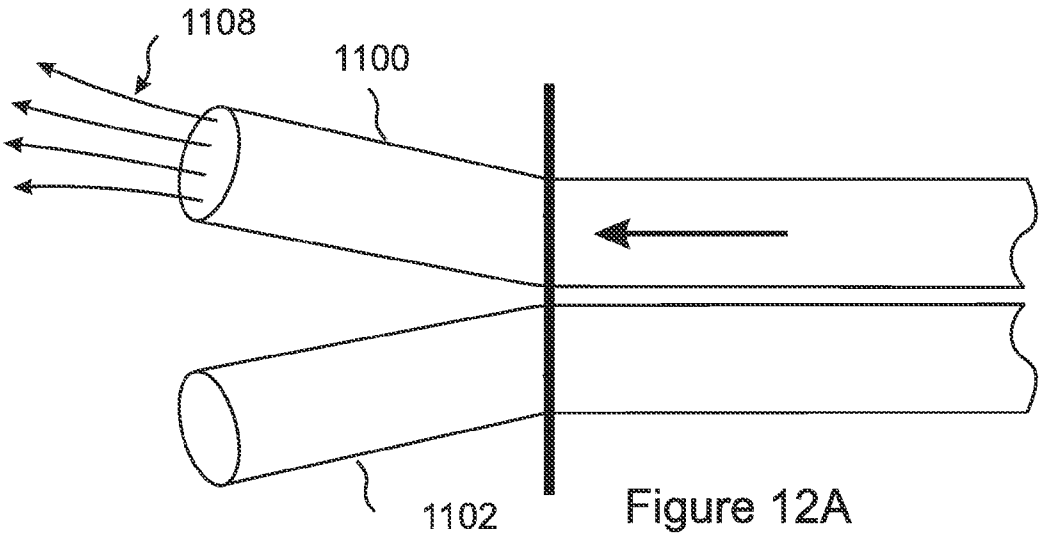


Figure 12A

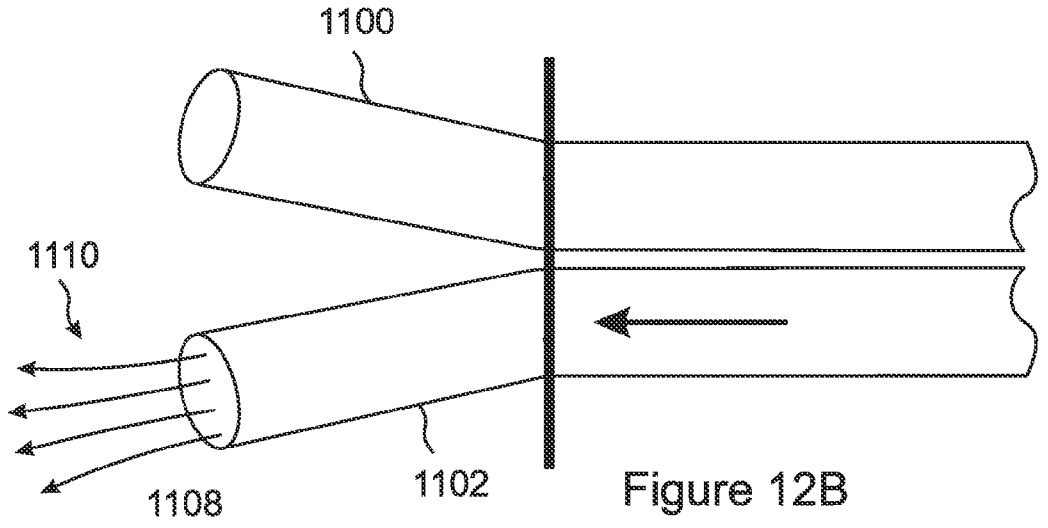


Figure 12B

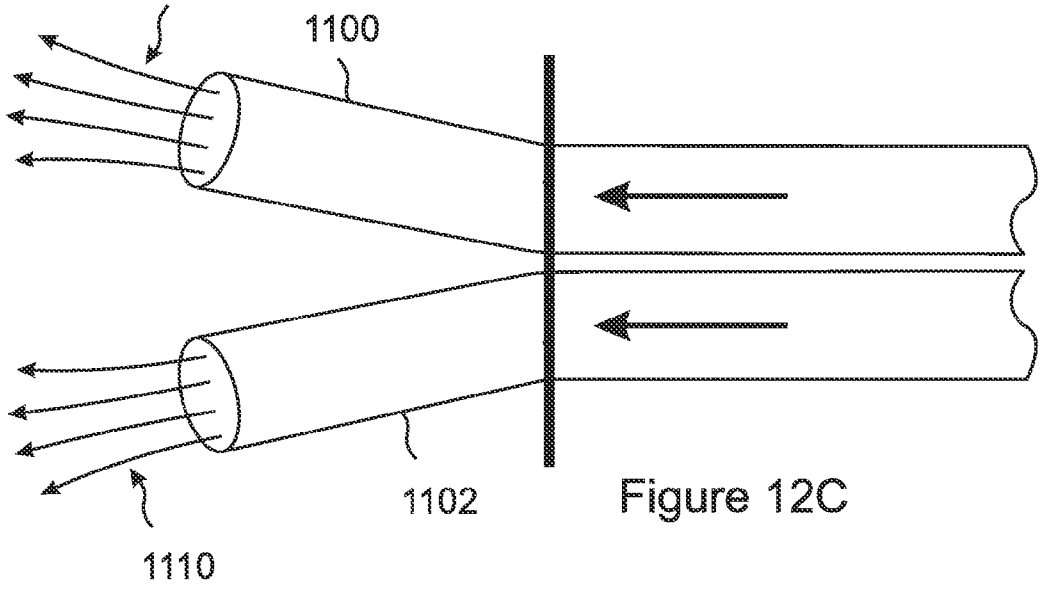


Figure 12C

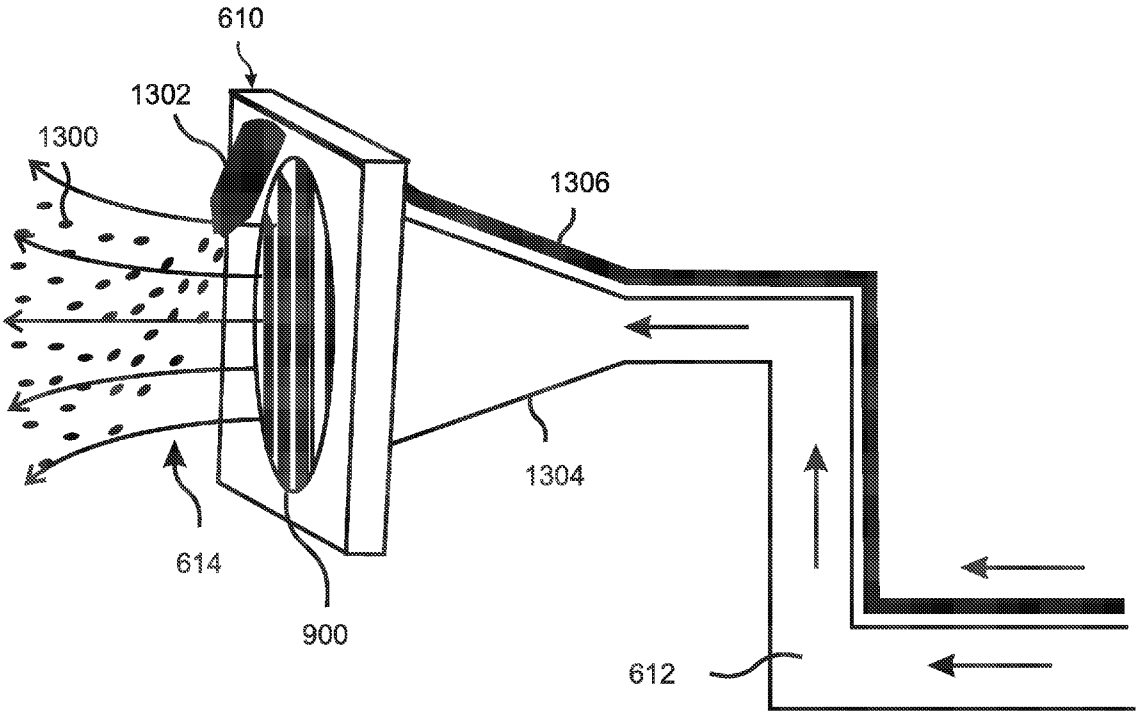


Figure 13

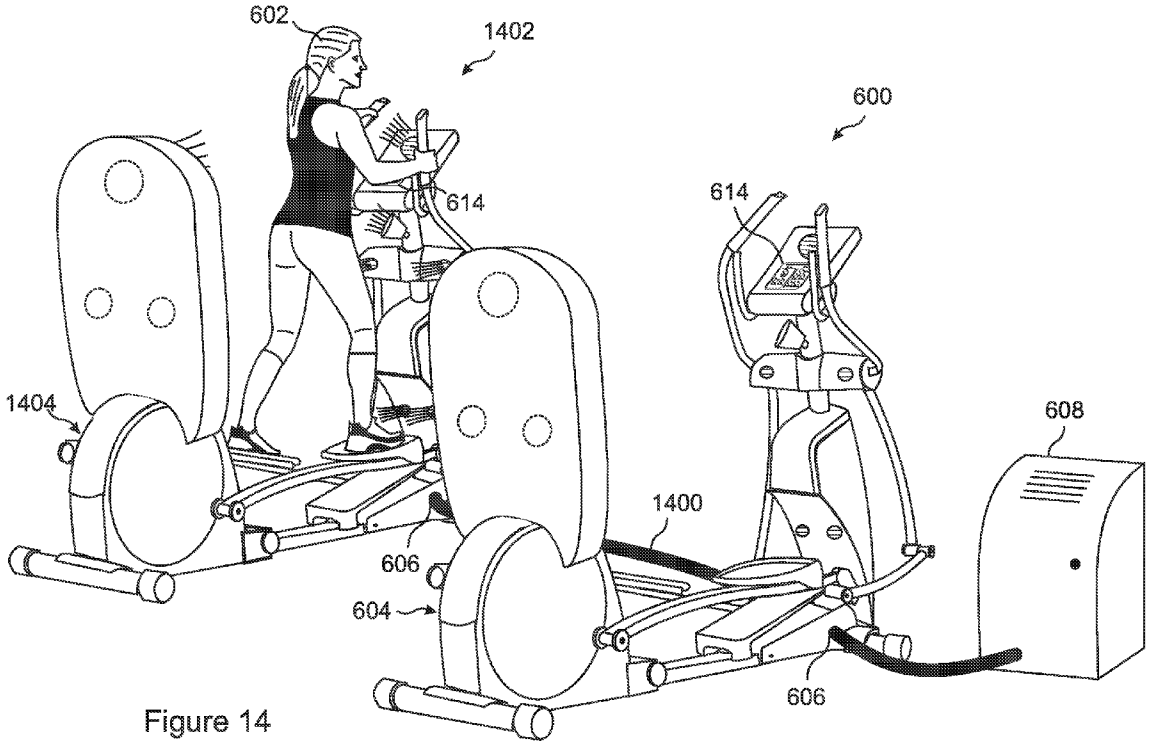


Figure 14

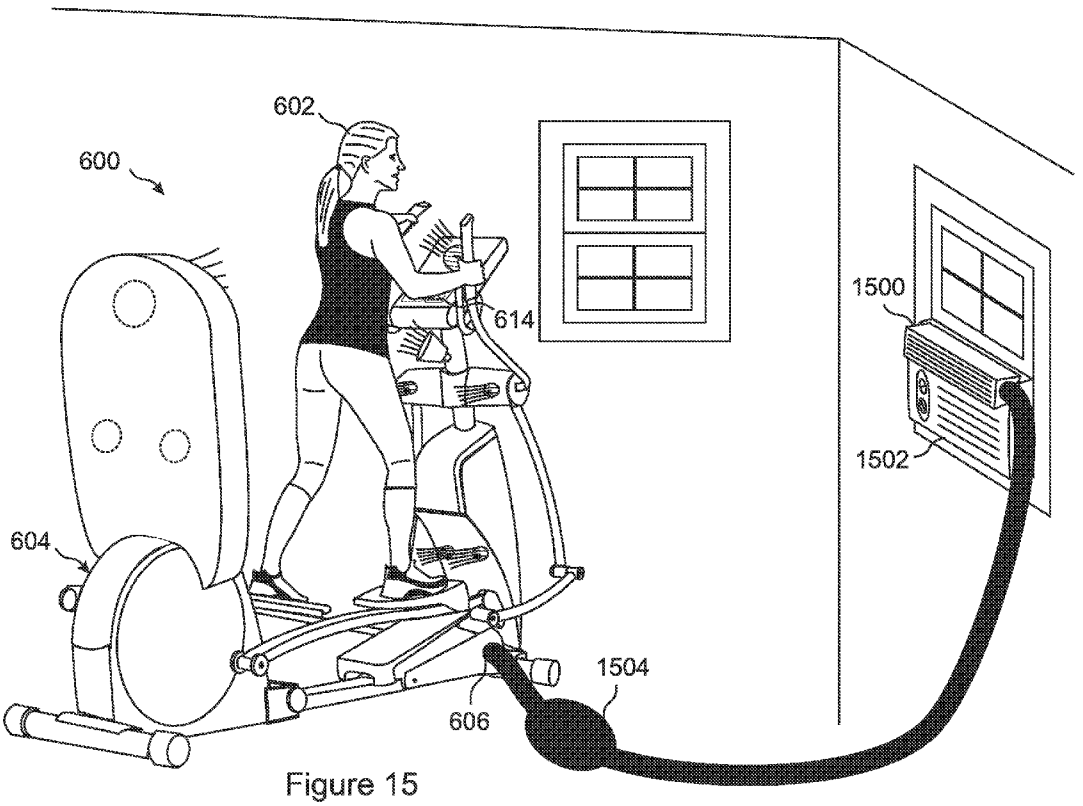
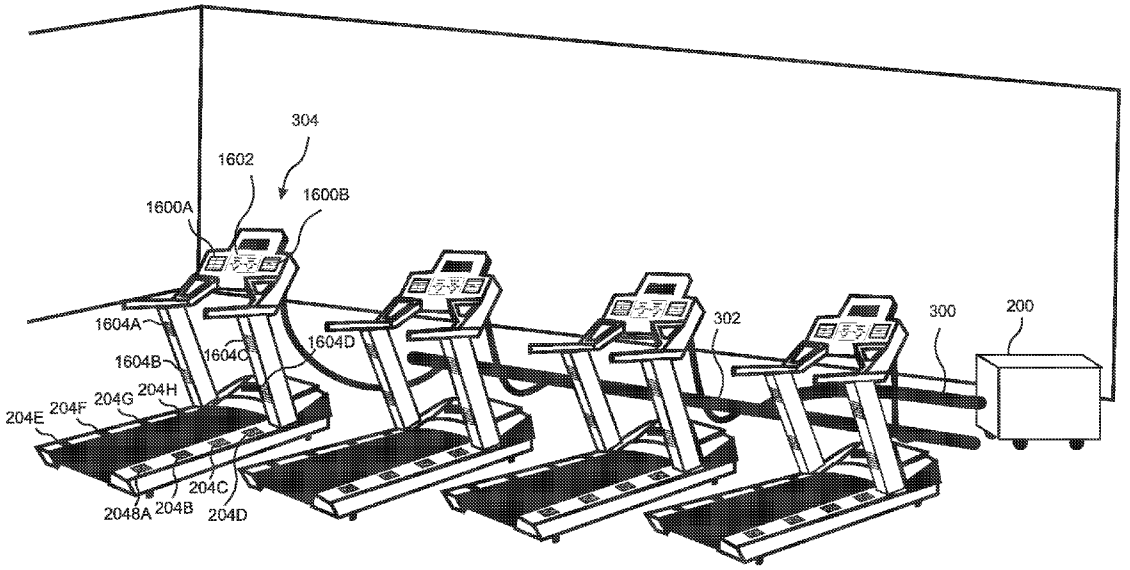


Figure 15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1600B
1600A
1604A
1604B
1604C
1604D
204E
204F
204G
204H
2048A
204B
204C
204D
302
300
200

Figure 16

APPARATUS FOR COOLING AN EXERCISER HAVING CONVENIENT CENTRALIZED CONTROL OF AIR OUTLETS BUILT INTO A STATIONARY EXERCISE DEVICE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a Continuation-in-Part of U.S. application Ser. No. 12/001,003, filed Dec. 7, 2007, herein incorporated by reference in its entirety. U.S. application Ser. No. _____, filed Nov. 22, 2010, entitled "APPARATUS FOR SURROUNDING AN EXERCISER WITH COOLING AIR HAVING MANUAL LOCAL CONTROL OF AIR OUTLETS BUILT INTO A STATIONARY EXERCISE DEVICE", herein incorporated by reference in its entirety, is also a Continuation-in-Part of U.S. application Ser. No. 12/001,003, filed Dec. 7, 2007. U.S. application Ser. No. _____, filed Nov. 22, 2010, entitled "APPARATUS FOR COOLING AN EXERCISER HAVING MANUAL LOCAL CONTROL OF AIR OUTLETS BUILT INTO DISCRETE COOLING ASSEMBLIES, herein incorporated by reference in its entirety, is also a Continuation-in-Part of U.S. application Ser. No. 12/001,003, filed Dec. 7, 2007.

FIELD OF THE INVENTION

[0002] This invention relates generally to exercise equipment, and particularly to cooling devices for use during exercise.

BACKGROUND OF THE INVENTION

[0003] Exercise is generally known to have many benefits for individuals of all ages. These benefits include improved cardiovascular health, reduced blood pressure, prevention of bone and muscle loss, maintenance of a healthy weight, improved psychological heath, and many others. However, exercise is generally accompanied by a certain degree of discomfort, including overheating, sweating, fatigue, etc, and this leads to a significant reduction in the amount of exercise undertaken by many individuals, thereby reducing the health benefits derived from exercise.

[0004] Because of weather variability, convenience, and time constraints, exercise often takes place indoors using a stationary exercise machine, such as a stepper, stationary bicycle, elliptical, treadmill, etc. Attempts are sometimes made to increase the comfort of exercising individuals in these environments by optimizing the surrounding temperature. But this can be largely unsatisfactory, because exercisers generally require different degrees of cooling depending on individual physiology and on how long and how vigorously they have been exercising. If the surrounding air is warm enough to be comfortable for individuals just beginning an exercise session, it will likely be too warm for individuals well into a vigorous session. And if the surrounding air is cool enough to be comfortable for an individual who has been exercising vigorously for a significant amount of time, it will likely be too cold for individuals just beginning to exercise.

SUMMARY OF THE INVENTION

[0005] In a general aspect of the invention, an apparatus is provided for convenient centralized control of a personal cooling environment of an exerciser by the exerciser while exercising. The apparatus includes a plurality of air outlets and a control center. Each air outlet is capable of being in airflow communication with a cooling air source providing a flow of cooling air. The plurality of air outlets are arranged so as to direct cooling air toward the exerciser to create a personal cooling environment for the exerciser. At least one air outlet is adjustable in response to a control signal, which in various embodiments is an electrical signal transmitted by a wire, or a mechanical signal communicated for example by rotation of a connecting shaft, or actuation of a coaxial cable, or a pneumatic signal transmitted through a hose or a pipe, or some other signaling mechanism. The control center is easily accessible to the exerciser while exercising and generates control signals in response to input from the exerciser. The control signals cause the at least one air outlet to change at least one characteristic of cooling air flowing through the at least one air outlet. The control signals together control the personal cooling environment.

[0006] In preferred embodiments, the cooling air is at least one of cool fresh air, chilled air, filtered air, ionized air, and dehumidified air. In other preferred embodiments, the personal cooling environment includes a plurality of flows of cooling air directed at a plurality of regions of the exerciser. In yet other preferred embodiments, the air outlets are built into a stationary exercise device.

[0007] In still other preferred embodiments, the personal cooling environment includes a plurality of flows of cooling air directed at at least one of the following regions of the exerciser: head; upper arm; forearm; upper front torso; lower torso; upper thigh; calf; upper back; lower back; and neck. In one embodiment, the personal cooling environment includes a plurality of individually adjustable flows of cooling air directed at a plurality of regions of the exerciser.

[0008] In yet other preferred embodiments, the at least one characteristic is at least one of the following: direction of cooling air flow; speed of cooling air flow; temperature of cooling air flow; humidity of cooling air flow; and quantity of cooling mist injected into the cooling air flow. In one embodiment, at least one of the control signals is at least one of: a mechanical control signal; an electro-mechanical control signal; a pneumatic control signal; a hydraulic control signal; an electronic control signal; and an electro-optical control signal. In some embodiments, the mechanical control signal is transmitted via at least one coaxial cable. In other embodiments, the at least one air outlet is an adjustable nozzle.

[0009] In still other preferred embodiments, the control center includes a cooling air distribution center, the cooling air distribution center being able to receive a flow cooling air from the cooling air source, the cooling air distribution center being able to supply a flow of cooling air to each of the plurality of air outlets, and the cooling air distribution center having a plurality of valves, each valve being capable of separately adjusting a flow of cooling air to a cooperative air outlet.

[0010] In yet other preferred embodiments, at least one of the plurality of air outlets includes a plurality of flow directors, each of the plurality of flow directors being directed in a different direction, each of the flow directors being separately adjustable in flow rate. In some embodiments, the direction of the flow of cooling air from the at least one air outlet is controlled by controlling the flow rates of the plurality of flow directors. In other embodiments, the flow of cooling air from the at least one air outlet forms a substantially diverging pattern when cooling air is supplied uniformly to all of the flow directors.

[0011] In still other preferred embodiments, the control center includes a plurality of controls arranged in a pattern that facilitates recognition by the exerciser of a correspondence between each of the controls and a corresponding region of the exerciser's body, whereby adjustment of the control causes adjustment of a characteristic of the cooling air applied to the corresponding region of the exerciser's body. In some embodiments, the pattern resembles an outline of at least a portion of a human body.

[0012] In yet other preferred embodiments, the apparatus further comprises a warm air source capable of supplying warm air to the exerciser. In some embodiments, the apparatus further comprises a cooling air output able to supply cooling air to a second apparatus for convenient centralized control of a second personal cooling environment of a second exerciser by the second exerciser while exercising. In other embodiments, the cooling air source is built into the stationary exercise device. In yet other embodiments, the cooling air source is external to the stationary exercise device.

[0013] In still other preferred embodiments, the cooling air source is a room air conditioner in airflow communication with the plurality of air outlets via an adaptor, the adaptor able to direct cooling air from the room air conditioner to the plurality of air outlets. In some embodiments, the adaptor includes a fan, the fan being able to increase at least one of flow rate and pressure of the cooling air directed from the room air conditioner to the plurality of air outputs.

[0014] In yet other preferred embodiments, the cooling air source is capable of providing cooling air to a thermally conductive surface that can come into thermal contact with at least a portion of the exerciser during exercise.

[0015] In some embodiments, the thermally conductive surface is at least a portion of one of: a seat; a backrest; and a hand grip.

[0016] Various preferred embodiments include both cooling air outlets which provide flows of cooling air, and conductive cooling applicators which provide cooling by thermal conduction due to a flow of cooling air flowing within each conductive cooling applicator, whereby the exerciser can select and control which types of cooling are to be applied and how much of each.

[0017] In preferred embodiments, the apparatus further includes at least one conductive cooling applicator capable of providing cooling by thermal conduction due to a flow of cooling air flowing within the conductive cooling applicator, the conductive cooling applicator being in airflow communication with a cooling air source providing the flow of cooling air, the conductive cooling applicator being located so as to at least sometimes be in thermally conductive contact with a portion of the exerciser, the conductive cooling applicator being responsive to control signals from the control center, the control signals causing the conductive cooling applicator to change at least one characteristic of cooling air flowing through the conductive cooling applicator, and the control center being capable of enabling the exerciser to control both conductive cooling and cooling air.

[0018] In some preferred embodiments, the cooling air source is able to supply cooling air to a plurality of stationary exercise devices, the cooling air being supplied at pressures and flow rates which meet the cooling requirements and preferences of exercisers using all or any subset of the stationary exercise devices.

[0019] Another general aspect of the invention is an apparatus for convenient centralized control of a personal cooling environment of an exerciser by the exerciser while exercising. The apparatus includes at least one conductive cooling applicator, each cooling applicator being capable of providing cooling by thermal conduction due to a flow of cooling fluid flowing within the conductive cooling applicator, each conductive cooling applicator being in fluid communication with a cooling fluid source providing the flow of cooling fluid, each conductive cooling applicator being located so as to at least sometimes be in thermally conductive contact with a portion of the exerciser, at least one conductive cooling applicator being responsive to control signals from the control center, the control signals causing the conductive cooling applicator to change at least one characteristic of cooling fluid flowing through the conductive cooling applicator, the control center being capable of enabling the exerciser to control at least conductive cooling.

[0020] In preferred embodiments, the apparatus further includes a least one air outlet, the air outlet capable of being in fluid communication with the fluid cooling source, the cooling fluid serving to cool a flow of air flowing through the air outlet so as to provide a flow of cooling air to an exerciser, the at least one air outlet being adjustable in response to a control signal from the control center, the control center being easily accessible to the exerciser while exercising, the control center generating control signals in response to input from the exerciser, the control signals causing the at least one air outlet to change at least one characteristic of cooling air flowing through the at least one air outlet.

[0021] In preferred embodiments, the cooling fluid is one of: water, air, water with anti-freeze, and freon.

[0022] In preferred embodiments, at least one characteristic of cooling fluid is at least one of: flow rate, and temperature.

[0023] Preferred embodiments provide a number of advantages over prior systems. For example, as recognized by the invention, preferred embodiments employ cooling air to improve the exerciser's experience. Humans generally perspire so that perspiration evaporates off of the skin, removing heat from the exerciser. In some cases, however, excessive perspiration fails to evaporate and thus fails to remove sufficient heat from the exerciser. Excessive perspiration can be uncomfortable for the exerciser, unsanitary, and generally undesirable. Moreover, if sufficient heat is not removed from the exerciser, serious heat-related illnesses can develop, such as heat stress, heat stroke, and nausea.

[0024] Generally, in similar temperature conditions, the presence or absence of airflow, or the particular flow rate, can be the determining factor as to whether the exerciser perspires. In typical exercise environments, such as the common gym, for example, the environment is designed to regulate the temperature of the gym as a whole. Sometimes, free-standing fans are included to help improve the air circulation within the gym.

[0025] However, as described in more detail below, preferred embodiments offer an exerciser a significant improvement in comfort, thereby tending to increase the amount of exercise and the benefits derived therefrom, while also reducing risk of heat-related illnesses and/or excessive sweating. For example, in preferred embodiments, cooling air flow directed to mostly surround an exerciser, for example a well-conditioned exerciser exercising at maximum aerobic capacity, reduces the propensity of the exerciser to perspire by a significant amount. The exerciser does not overheat and perspires much less while using the invention, and consequently the exercise is limited primarily by the amount of work the exerciser can do, and not by discomfort of overheating or the risk of heat-related illness.

[0026] Additionally, preferred embodiments help reduce excessive sweating as well as the symptoms of heat-related illness, or its onset. For example, preferred embodiments tend to reduce nausea while exercising, decrease perspiration dripping over the exercise machine and floor, and reduce nausea after exercising.

[0027] Additionally, for certain exercisers, preferred embodiments eliminate the tendency to perspire entirely. For example, preferred embodiments prevent an average exerciser of modest aerobic capacity, who is not working near their maximum, from any perspiration at all. Eliminating perspiration can provide a number of additional benefits.

[0028] For example, perspiration typically causes body odor. As such, typical exercisers tend to bathe after exercise. But without perspiration, bathing is less necessary, which reduces hot water consumption as exercisers take fewer showers, and shortens the total time required to visit the gym and engage in a workout. Additionally, certain gyms do not have bathing facilities. Eliminating perspiration eliminates the need for an exerciser to exercise hard, get soaked in perspiration, and then drive home. Consequently, gyms could generally maintain higher exercise room temperatures thereby reducing energy costs.

[0029] Additionally, overweight people generally have a body mass relative to surface area that makes heat loss particularly difficult. Preferred embodiments can greatly reduce heat stress in the obese during exercise. Reducing the risk of heat-related illness, and generally making exercise more comfortable, could be the difference that allows and/or encourages certain obese people to exercise effectively, helping them to lose weight.

[0030] Preferred embodiments incorporating the SurroundCool™ effect, described in more detail below, affect a greater surface area of an exerciser than known approaches to cooling an exerciser, thereby improving the transfer of heat away from the exerciser. Additionally, because the SurroundCool™ effect operates upon a greater surface area than known approaches, preferred embodiments provide superior perspiration evaporation.

BRIEF DESCRIPTION OF THE DRAWINGS

[0031] FIG. **1** is a perspective view of a preferred embodiment that includes an air conditioner attached to a stationary exercise device, the air conditioner being connected to a heat exhausting duct, the embodiment further including a built-in cooling air outlet with a fan;

[0032] FIG. **2**A is a perspective view of a preferred embodiment that includes an air conditioner separate from a stationary exercise device, and a cooling air outlet with a fan, which is attached to the stationary exercise device;

[0033] FIG. **2**B is a perspective view of a preferred embodiment that includes an air conditioner separate from a stationary exercise device and a built-in cooling air outlet with a fan;

[0034] FIG. **2**C is a perspective view of a preferred embodiment that includes an air conditioner separate from a stationary exercise device, a plurality of cooling air outlets built into the deck of the stationary exercise device (here, a treadmill), and an air characteristic controller that allows the exerciser to adjust the flow rate and temperature of the cooling air;

[0035] FIG. **3** is a perspective view of a preferred embodiment that includes a cooling air source located outside of an exercise room, the cooling air source being able to supply cooling air to a plurality of stationary exercise devices within the exercise room;

[0036] FIG. **4**A is a functional diagram illustrating flow of cooling air through cooling air outlets having adjustable louvers;

[0037] FIG. **4**B is a functional diagram illustrating an air conditioner that includes a thermally conductive pipe cooled by a cooling liquid, cooling air being cooled by flowing past the thermally conductive pipe;

[0038] FIG. **4**C is a functional diagram illustrating injection of cooling mist into a flow of cooling air through the cooling air outlet of FIG. **4**A;

[0039] FIG. **5**A is a perspective view of a preferred embodiment in which the back of an exerciser is cooled by a flow of cooling air directed onto the exerciser from a cooling air outlet attached to the rear of the exercise device;

[0040] FIG. **5**B is a perspective view of a preferred embodiment in which an exerciser is cooled by conduction through contact with a seat, a backrest, and handles, each of which is cooled by a cooling fluid;

[0041] FIG. **5**C is a cross-sectional view illustrating cooling of the handles by the cooling fluid in the embodiment of FIG. **5**B;

[0042] FIG. **5**D is a perspective view of an embodiment in which the back of an exerciser is cooled by a plurality of flows of cooling air from a plurality of cooling air outlets attached to the rear of a stationary exercise device, and having a control center that is conveniently accessible to the exerciser;

[0043] FIG. **6**A is a perspective view of a preferred embodiment that includes a plurality of cooling air outlets included in a stationary exercise device and arranged so as to mostly surround an exerciser within a plurality of flows of cooling air, and having a control center that is conveniently accessible to the exerciser;

[0044] FIG. **6**B is a perspective drawing of an embodiment similar to FIG. **6**A, but including a built-in cooling air source, and showing the control center that is conveniently accessible to the exerciser (not shown);

[0045] FIG. **7**A is a front view of the control center of FIGS. **6**A and **6**B;

[0046] FIG. **7**B is a rear view of the interior of the control center of FIG. **7**A, showing distribution of cooling air through valves that are controlled by the exerciser via the control center of FIG. **7**A;

[0047] FIG. **8** is a front view of a control center in a preferred embodiment wherein the controls are electronic, each control being located on a respective portion of a representation of an exerciser's body, thereby enabling an exerciser to readily control the cooling air flow directed toward each corresponding portion of the exerciser's body;

[0048] FIG. **9**A is a perspective side view of a cooling air outlet having mechanically adjustable air-directing louvers, the louvers being adjusted by manipulation from the control center of a coaxial cable, the louvers being shown tipped diagonally downward;

[0049] FIG. **9**B is a perspective side drawing of the embodiment of FIG. **9**A with the louvers being shown tipped diagonally upward;

[0050] FIG. **9**C is a perspective side drawing of the embodiment of FIG. **9**A with the louvers being shown closed;

[0051] FIG. **10**A is a front view of a cooling air outlet having diagonally directed louvers, the direction of the cooling air flow from the cooling air outlet being adjustable by manipulation from the control center of a coaxial cable so as to rotate the cooling air outlet, the outlet being shown rotated to a first angle and the cable being shown as fully retracted;

[0052] FIG. **10**B is a front view of the embodiment of FIG. **10**A, the outlet being shown rotated to a second angle, and the cable being shown partially extended;

[0053] FIG. **10**C is a front perspective view of the embodiment of FIG. **10**A, the outlet being shown rotated to a third angle, and the cable being shown as fully extended;

[0054] FIG. **11** is a perspective view of a cooling air outlet having four cooling air flow directors, the air flow directors diverging so as to direct cooling air in different directions;

[0055] FIG. **12**A is a side view of two of the air flow directors of FIG. **11**, showing cooling air applied only to the upper flow director so as to direct cooling air diagonally upward;

[0056] FIG. **12**B is a side view of the two air flow directors of FIG. **12**A, showing cooling air applied only to the lower flow director so as to direct cooling air diagonally downward;

[0057] FIG. **12**C is a side view of the two flow directors of FIG. **12**A, showing cooling air being applied to both of the flow directors, thereby causing flows of cooling air to be directed both diagonally upward and diagonally downward;

[0058] FIG. **13** is a perspective view of a cooling air outlet showing droplets of mist being injected into a flow of cooling air emerging from the cooling air outlet;

[0059] FIG. **14** is a perspective view of two stationary exercise devices, showing cooling air supplied from a cooling air output of one of the stationary exercise devices to a neighboring stationary exercise device;

[0060] FIG. **15** is a perspective view of a stationary exercise device having a room air conditioner adaptor, showing the adaptor collecting cooling air from a window-mounted room air conditioner (also called a "window air conditioner") and driving the collected cooling air to the stationary exercise device; and

[0061] FIG. **16** is a perspective view of a preferred embodiment that includes a cooling air source located in an exercise room and able to supply cooling air to a plurality of stationary exercise devices within the exercise room, each stationary exercise device having a plurality of built-in cooling air outlets and a conveniently located control center.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS

[0062] The present invention is a cooling apparatus having a conveniently located control panel, the cooling apparatus being useful for reducing overheating, sweating, fatigue, etc, of an exerciser using a stationary exercise device, and thereby increasing the frequency and duration of workouts and correspondingly increasing the health benefits derived from exercise.

[0063] The cooling apparatus is capable of creating a personal cooling environment for the exerciser by surrounding the exerciser with cooling air applied directly to the exerciser by one or more cooling air outlets. Preferred embodiments create a personal cooling environment for the exerciser while the exerciser is using the stationary exercise device.

[0064] At least one characteristic of the cooling air, such as the temperature and/or the flow rate, is adjustable by the exerciser while exercising, thereby enabling the exerciser to optimize his or her personal comfort by adjusting the cooling of the personal cooling environment according to personal preferences. In a multi-exerciser gym environment, each exerciser is able to optimize his or her personal cooling environment, regardless of the preferences of other exercisers and of non-exercising gym occupants.

[0065] In various embodiments, overall cooling costs are reduced by directly cooling the exerciser(s) rather than relying entirely on cooling an entire room or gym. The comfort of each individual exerciser is thereby optimized, which encourages exercisers to workout longer and more often. As a result, exercisers experience an increase in all of the benefits inherent in the exercise experience, including the burning of more calories and, therefore, the loss of more weight. These benefits are achieved sooner and with far more comfort, due to the decrease in overheating and the significant decrease or even the elimination of sweating. Exercisers who prefer not to shower at a gym may even find that the reduction in overheating and sweating due to the present invention is sufficient to allow them to continue their activities after a workout without showering. Commercial gyms which utilize the invention can thereby compete more successfully for members by advertising that they offer these benefits. They can also increase their bottom line by lowering their cooling costs while providing maximum exerciser comfort for each exerciser at each stage of a workout.

[0066] Exercise on a stationary exercise device typically causes certain regions of the body to generate more heat than others, depending on individual physiology and also on the type of exercise being performed. Embodiments of the present invention are capable of enhancing comfort, performance, and health benefits in targeted regions of the body by enabling the exerciser to separately control at least one characteristic of the cooing air applied by each of a plurality of cooling vents. This enables the exerciser to apply vigorous cooling to those regions of the body which need it, while other regions of the body, such as the chest and face, are maintained at more moderate temperatures.

[0067] With reference to FIG. **1**, in a preferred embodiment the apparatus includes a cooling fluid source **100**, in this case an air cooler (such as an air conditioner) **100**, which is attached to a stationary exercise device **102** and supplies air that is cooler than the ambient air surrounding the stationary exercise device **102** to a fan **104** that is part of the stationary exercise device **102**. The fan **104** serves as the applicator of the cooling air by directing a flow of cooling air toward the front of an individual (not shown) using the device. Warm air resulting from the air cooling process is exhausted from the air cooler **100** through an air duct **106**.

[0068] In the preferred embodiment of FIG. **2**A, the apparatus includes an air cooler **200** that is not attached to the stationary exercise device **102**. The air cooler **200** supplies cooling air thorough a hose **202** to a fan **104** that is attached to the stationary exercise device **102**. As in FIG. **1**, the fan **104** serves as the applicator of the cooling air by directing a flow of cooling air toward the front of an individual (not shown) using the device. FIG. **2**B illustrates an embodiment similar to the embodiment of FIG. **2**A, except that the fan **104** is built into the stationary exercise device **102**.

[0069] FIG. **2**C illustrates a preferred embodiment that includes an air cooler **200** that is not attached to the stationary exercise device **102**. The air cooler **200** supplies cooling air thorough a hose **202** and through a conduit in the body of the stationary exercise device **102** to a series of cooling air outlets **204**A-H located along the base of the stationary exercise device **102**, which direct cooling air upward from below toward an exercising individual (not shown) using the stationary exercise device **102**. The cooling air outlets **204**A-H include air directing louvers which can be manually adjusted by the exerciser to direct the cooling air in different direc-

tions. An air characteristic controller **206** on the front of the stationary exercise device **102** allows an exercising individual (not shown) to adjust the overall flow rate and temperature of the cooling air.

[0070] The preferred embodiment illustrated in FIG. **3** is similar to the embodiment of FIG. **2**B, except that the cooling air source is located outside of the room and supplies cooling air that is also dry air. The cool, dry air is supplied through a connection **300** in the wall of the room through a cooing air delivery hose to a manifold **302**, and from the manifold to cooling air outlet fans **305** built into a plurality of stationary exercise devices **304**.

[0071] FIG. **4**A and FIG. **4**B are functional diagrams that illustrate cooling fluid applicators in two respective preferred embodiments. In FIG. **4**A, cooling air **400** flows through a duct **402**, and exits from a vent **404** through a set of air directing louvers **406**. The direction of the louvers **406** can be adjusted via a wheel **408** located below the louvers, in response to control signals from a control center. In FIG. **4**B, cool water flows through a pipe **410** to a heat exchange device **412** with a large surface area. Air **414** is pulled by a fan **416** past the heat exchange device **412**, thereby conductively cooling the air **418**, which is then directed by the cooling air outlet **416** onto an exercising individual (not shown).

[0072] FIG. **4**C is a functional diagram that illustrates the injection of a cooling mist **420** into the cooling air **400** of FIG. **4**A. Water travels through a hose **422** to a spray nozzle **424**, which transforms the water into mist droplets **420**. The droplets enter a mixing chamber **426** where they mix with the flow of cooling air **400** and are carried through the vent **404** by the cooling air **400**.

[0073] In the preferred embodiment of FIG. **5**A, a cooling fluid source **500** supplies cool liquid through a set of hoses **502** to a heat exchange device and fan **504** similar to the device and fan shown in FIG. **4**B. The heat exchange device and fan **504** is attached to the back of a stationary exercise device **506** on which an individual **508** is exercising in a seated position, and directs a flow of cooled air **510** onto the exercising individual **508** from behind. In this embodiment, the source **500** of cooling fluid is a closed loop liquid chiller and circulator with a self contained cooling liquid reservoir that is accessible through a hatch **512** on the top. Typically, a mixture of water and anti-freeze with anti-corrosion properties is used as the cooling liquid. The cooling fluid could also be Freon.

[0074] The preferred embodiment of FIG. **5**B uses a liquid chiller **500** similar to the chiller **500** of FIG. **5**A, but the chilled liquid is supplied to conductive cooling applicators which are included in the handles **514**, the seat **516**, and the backrest **518** of the stationary exercise device **506**. The individual **508** using the stationary exercise device **506** is cooled by direct conductive thermal contact with the cooled handles **514**, seat **516** and backrest **518**. In some applications it may be desirable to have only conductive cooling applicators, without any cooling air outlets and/or fans to provide convective cooling. These conductive cooling applicators can be controlled by the control center by controlling the flow of the cooling liquid to the conductive cooling applicators, just as the air outlets are controlled by the control center so as to control flows of chilled air.

[0075] FIG. **5**C is a cross-sectional diagram that illustrates the cooling of the handles in the preferred embodiment of FIG. **5**B by the chilled liquid. The liquid flows into and up one of the supporting arms **518** that supports the hand grips, through the two hand grips **514**, which in this embodiment are metal and provide good thermal contact with the chilled liquid, and then down the other supporting arm **520**. The interiors of the supporting arms **518**, **520** and the cross brace **522** between the handles are thermally insulated so as to avoid warming of the chilled liquid as it flows up to and down from the handles, and to avoid water condensation on the supporting arms **518**, **520** and the cross brace **522**.

[0076] Various preferred embodiments include both cooling air outlets which provide flows of cooling air **504**, and conductive cooling applicators **514**, **516**, **518** which provide cooling by thermal conduction due to a flow of cooling air flowing therewithin, whereby the exerciser can select and control which types of cooling are to be applied, and how much of each. Of course, it is also possible to include only the conductive cooling applicators **514**, **516**, **518** which provide cooling by thermal conduction due to a flow of cooling air flowing therewithin, whereby the exerciser can select and control how much conductive cooling is desired.

[0077] The embodiment of FIG. **5**D uses a liquid chiller **500** similar to the chiller of FIG. **5**A, but the chilled liquid is supplied to cooling air outlets **504**A-D, wherein air is cooled by the chilled liquid in a manner similar to the outlet of FIG. **4**B, the plurality of cooling air outlets **504**A-**504**D being built into the structure of the exercise device and positioned so as to surround a region behind the exerciser **508**, thereby creating a personal cooling environment adjacent to the back of the exerciser **508**. The embodiment of FIG. **5**D further includes a conveniently located control panel **524** which enables the exerciser **508** to control the cooling air flow rates of each of the individual cooling air outlets **504**A-**504**D, and of each of the conductive cooling applicators **514**, **516**, **518**, without requiring the exerciser **508** to interrupt his exercise session.

[0078] With reference to FIG. **6**A, embodiments **600** of the present invention include a cooling air input **606** which is connectable to a cooling air source **608**, the cooling air source **608** being capable of supplying a flow of cooling air to the stationary exercise device **604**, the cooling air being at least one of chilled and dehumidified. The apparatus **600** includes at least one cooling air outlet **610**A-I, each cooling air outlet **610**A-I being connected to the cooling air input **606**, each cooling air outlet **610**A-I being at least attached to the stationary exercise device **604**, each cooling air outlet **610**A-I being capable of applying cooling air **612** to the body of the exerciser **602**.

[0079] Each cooling air outlet is also able to adjust at least one characteristic of the cooling air **612** applied by the cooling air outlet **610**A-I to the exerciser's body **602**, in response to control signals from a control center. In various embodiments, the control signals are an electrical signals transmitted by wires, or are mechanical signals communicated for example by rotation of connecting shafts or actuation of coaxial cables, or are pneumatic signals transmitted through hoses or pipes, or some other signaling mechanism. As shown, the apparatus further includes a control center **614** that is able to provide the control signals to the cooling air outlets **610**A-I, and thereby enable the exerciser **602** to control the one or more cooling air outlets **610**A-I. The control center **614** is easily accessible to the exerciser **602** while the exerciser **602** is exercising on the stationary exercise device **604**, so that in preferred embodiments, the exerciser **602** is able to adjust the air outlets without interrupting a workout.

[0080] In the embodiment of FIG. **6**A, the cooling air source **608** is external to the stationary exercise device **604**, and cooling air **612** is supplied to a plurality of cooling air outlets **610**A-I, each of which is directed to a different region of the exerciser's body **602**. Some of the cooling air outlets **610**A-C are attached to the stationary exercise device **604**, either directly or by mounting structures **618** attached to the stationary exercise device **604**. Other cooling air outlets **610**D-I are built into the stationary exercise device **604**.

[0081] The control center **614** is included in a panel **616** of the stationary exercise device **604**, which is conveniently located in front of the exerciser **602** and within easy reach of the exerciser **602**. Thus, the exerciser **602** can separately adjust the flow speeds, temperatures, directions, and/or other characteristics of each of the cooling air outlets **610**. As such, the exerciser **602** can respond to the varying cooling needs of each separate region of the exerciser's body, without interrupting the exercise routine.

[0082] FIG. **6**B illustrates a preferred embodiment similar to FIG. **6**A, except that the cooling air source **608** and cooling air inlet **606** are included within the stationary exercise device **604**. The exerciser **602** is not shown in FIG. **6**B for clarity of illustration.

[0083] FIG. **7**A is a front view of the control center **614** of FIGS. **6**A and **6**B. In this embodiment the control center **614** is divided into two groups **700**, **702** of controls **704**, one group **700** for controlling the cooling of the front of the exerciser's body, and the other group **702** for controlling the cooling of the back of the exerciser's body. Each group includes a plurality of knobs **704** that control the flow of cooling air **612** to cooling air outlets **610**A-I directed toward the corresponding regions of the exerciser's body. Above the control center **614** is a cooling air outlet **617** that includes a set of manually controlled directional louvers for adjusting the direction of the cooling air flowing from the outlet **617**.

[0084] FIG. **7**B illustrates the interior of the panel **616** of FIG. **7**A as seen from behind. In this embodiment, cooling air is distributed from the control center **614**. The cooling air source delivers cooling air from a supply hose **706** to a cooling air distribution center **708**, from which separate supply hoses **710** transfer the cooling air to a plurality of valves **712**, which are controlled by the knobs **740** shown in FIG. **7**A. From the valves **712**, the cooling air flows through pipes **714** to cooling air outlets **610**A-I.

[0085] FIG. **8** illustrates a control center **614** in an embodiment similar to FIG. **7**A, except that the adjusters (not shown) are electronically controlled by touch controls **800**. The touch controls **800** are arranged in patterns corresponding to illustrations of the front **802** and back **804** of a person's body. This enables the exerciser **602** to immediately associate each of the touch controls **800** with the region of the exerciser's body to which it is directed. Touch controls **806** in a second group provide selection of which characteristic of the cooling air is to be controlled, and an adjusting slider control **808** is able to vary the selected characteristic. For example, if the exerciser **602** wishes to increase the speed of flow of cooling air against the back of her left knee, she first touches the touch control **800** located on the left rear knee of the illustrated exerciser in the rear control region **700**. She then touches the top characteristic control **806** labeled "speed," and finally slides the slider **808** to the right.

[0086] FIG. **9**A illustrates an air outlet **610** in an embodiment where the air outlet **610** includes a set of louvers **900** as an air flow-rate and flow-direction adjuster. The louvers **900** are connected to each other by a control rod **902**, which is coupled by a coupling **904** to the central wire **906** of a coaxial cable **908**. The coaxial cable **908** provides mechanical communication with the cooling control center **614**, and thereby provides remote mechanical control of the louvers **900** from the cooling control center **614**. In various embodiments, the coaxial cable **908** responds to moving of a lever or turning of a knob on the control panel.

[0087] In FIG. **9**A, the louvers **900** are shown directing the cooling air **612** slightly downward. In FIG. **9**B, the cooling air outlet **610** of FIG. **9**A is shown with the central wire **906** of the coaxial cable **908** slightly withdrawn, causing the lovers **900** to direct the cooling air **612** slightly upward. And in FIG. **9**C, the central wire **906** of the coaxial cable **908** has been fully extended, so as to cause the louvers **900** to tip upward and close the cooling air outlet **610**.

[0088] FIG. **10**A illustrates a cooling air outlet **610** from the front, in an embodiment where the cooling air outlet **610** includes louvers that direct cooling air **612** at an angle. The cooling air outlet **610** in FIG. **10**A can be rotated so as to change the direction of the cooling air **612**. Rotation of the cooling air outlet **610** is controlled by a coaxial cable **908** similar to the coaxial cable **908** of FIGS. **9**A through **9**C. The center wire **906** of the coaxial cable is connected to a coupler **904**, which is attached to a cable track **1000** surrounding the cooling air outlet **610**.

[0089] As illustrated in FIGS. **10**B and **100**, extension of the central wire **906** of the coaxial cable **908** pushes the coupling **904** away from the coaxial cable **908**, causing the cable track **1000** and the cooling air outlet **610** to rotate in a counter-clockwise direction, as shown in the figures. The central wire **906** is wound into the cable track **1000** as it is extended, thereby winding the central wire **906** around the periphery of the cooling air outlet **610**. Withdrawal of the central wire **906** into the coaxial cable **908** reverses this process, and causes the cooling air outlet **610** to rotate clockwise.

[0090] FIG. **11** illustrates a cooling air outlet **610** in an embodiment in which the cooling air outlet **610** includes a plurality of flow directors **1100**-**1106**, each of the plurality of flow directors being directed in a different direction.

[0091] FIGS. **12**A through **12**C illustrate two of the flow directors **1100**, **1102** of FIG. **11** under various conditions. The other two flow directors **1104**, **1106** have been omitted from FIGS. **12**A through **12**C for clarity of illustration. If cooling air is only supplied to the upper flow director **1100**, as shown in FIG. **12**A, well focused air **1108** emerges in a slightly upward direction. If cooling air is only supplied to the lower flow director **1102**, as shown in FIG. **12**B, well focused air **1110** emerges in a slightly downward direction.

[0092] If cooling air is supplied equally to both flow directors **1100**, **1102**, as illustrated in FIG. **12**C, cooling air emerges simultaneously in two directions **1108**, **1110**. Other combinations of cooling air flow supplied to the flow directors **1100**-**1104** will provide other combinations of cooling air quantity and direction.

[0093] FIG. **13** illustrates injection of mist droplets **1300** by a mist injector **1302** into a flow of cooling air **614**. The mist droplets **1300** are injected as the cooling air **614** flows out of a cooling air outlet **610**. Water is supplied to the mist injector **1302** through water lines **1306** from a water source (not shown). As a result, a mixture of cooling air **614** and mist droplets **1300** is applied by the cooling air outlet **610** to the body of the exerciser **602**.

[0094] FIG. **14** illustrates an embodiment similar to FIG. **6**, except that the apparatus **600** includes a cooling air output **1400**. The cooling air output **1400** enables the apparatus **600** to supply cooling air to a second apparatus **1402** at least attached to a second stationary exercise device **1404**. This enables the cooling air source **608** to supply cooling air to both of the cooling apparatuses **600**, **1402** of the present invention without requiring a direct cooling air connection between the cooling air source **608** and the second cooling apparatus **1402**.

[0095] Embodiments of the present invention apply cooling air specifically where it is needed, i.e. to the body of the exerciser **602**, and in some embodiments to targeted regions of the body of the exerciser **602**. Embodiments of the invention create a cooling region which surrounds at least part of the body of the exerciser **602**. As a consequence, with reference to FIG. **15**, in some preferred embodiments, overall cooling requirements are reduced for the room in which the stationary exercise device **604** is located, and a room air conditioner **1502** intended for cooing the entire room may be unneeded or at least may have unused capacity. In some embodiments, as illustrated in FIG. **15**, a room air conditioner **1500** is used as the source of cooling air, rather than a separate, dedicated cooing air source **608**. In these embodiments, the cooling air input **606** is connected to an adaptor **1502**, which collects and diverts cooling air from the room air conditioner **1500** to the cooling air input **606**. In some embodiments the adaptor includes a boosting fan **1504** which increases the pressure and/or flow rate of the cooling air supplied to the cooling air input **606**.

[0096] The preferred embodiment illustrated in FIG. **16** includes a cooling air source **200** located inside of an exercise room which supplies cooling air to a plurality of exercise devices **304**, each of which includes a pair of cooling air outlets **1600**A, **1600**B in its upper structure which can direct cooling air toward the face of an exerciser, a plurality of cooling air vents along its base **204**A-H which can direct cooling air upward toward the exerciser from below, and a plurality of cooling air outlets **1604**A-D located in upright structures which can direct cooling air toward the front of the exerciser. In similar embodiments, the cooling air source is located outside of the exercise room. The cooling air source **200** of FIG. **16** is able to supply cooling air to the plurality of stationary exercise devices **304** at pressures and flow rates which meet the cooling requirements and preferences of exercisers using all or any subset of the exercise devices **304**.

[0097] An easily accessible control center **1602** provides control over the fan speed and temperature of the cooling air flowing from each of the cooling air outlets **1600**A, **1600**B, **204**A-H, **1604**A-D, thereby enabling the exerciser to control the temperatures and flow rates of each of the individual cooling air outlets according to his or her preferences, without requiring the exerciser to interrupt his or her exercise session.

[0098] Other modifications and implementations will occur to those skilled in the art without departing from the spirit and the scope of the invention as claimed.

[0099] Accordingly, the above description is not intended to limit the invention except as indicated in the following claims.

What is claimed is:

1. An apparatus for convenient centralized control of a personal cooling environment of an exerciser by the exerciser while exercising, the apparatus comprising:

a plurality of air outlets,

each air outlet capable of being in airflow communication with a cooling air source providing a flow of cooling air;

the plurality of air outlets being arranged so as to direct cooling air toward the exerciser to create a personal cooling environment for the exerciser; and

at least one air outlet being adjustable in response to a control signal; and

a control center,

the control center being easily accessible to the exerciser while exercising;

the control center generating control signals in response to input from the exerciser, the control signals causing the at least one air outlet to change at least one characteristic of cooling air flowing through the at least one air outlet; and

the control signals together controlling the personal cooling environment.

2. The apparatus of claim **1**, the cooling air being at least one of fresh air, chilled air, filtered air, ionized air, and dehumidified air.

3. The apparatus of claim **1**, wherein the personal cooling environment includes a plurality of flows of cooling air directed at a plurality of regions of the exerciser.

4. The apparatus of claim **1**, wherein the plurality of air outlets are built in to a stationary exercise device.

5. The apparatus of claim **1**, wherein the personal cooling environment includes a plurality of flows of cooling air directed toward at least one of the following regions of the exerciser:

head;
upper arm;
forearm;
upper front torso;
lower torso;
upper thigh;
calf;
upper back;
lower back; and
neck.

6. The apparatus of claim **1**, wherein the personal cooling environment includes a plurality of individually adjustable flows of cooling air directed at a plurality of regions of the exerciser.

7. The apparatus of claim **1**, wherein the at least one characteristic is at least one of the following:

direction of cooling air flow;
rate of cooling air flow;
temperature of cooling air flow;
humidity of cooling air flow; and
quantity of cooling mist injected into the cooling air flow.

8. The apparatus of claim **1**, wherein at least one of the control signals is at least one of:

a mechanical control signal;
an electro-mechanical control signal;
a pneumatic control signal;
a hydraulic control signal;
an electronic control signal; and
an electro-optical control signal.

9. The apparatus of claim **8**, wherein the mechanical control signal is transmitted via at least one coaxial cable.

10. The apparatus of claim **1**, wherein the at least one air outlet is an adjustable nozzle.

11. The apparatus of claim **1**, wherein the control center includes a cooling air distribution center,

the cooling air distribution center being able to receive a flow cooling air from the cooling air source,

the cooling air distribution center being able to supply a flow of cooling air to each of the plurality of air outlets, and

the cooling air distribution center having a plurality of valves, each valve being capable of separately adjusting a flow of cooling air to a cooperative air outlet.

12. The apparatus of claim **1**, wherein at least one of the plurality of air outlets includes a plurality of flow directors, each of the plurality of flow directors being directed in a different direction, each of the flow directors being separately adjustable in flow rate.

13. The apparatus of claim **12**, wherein the direction of the flow of cooling air from the at least one air outlet is controlled by controlling the flow rates of the plurality of flow directors.

14. The apparatus of claim **12**, wherein the flow of cooling air from the at least one air outlet forms a substantially diverging pattern when cooling air is supplied uniformly to all of the flow directors.

15. The apparatus of claim **1**, wherein the control center includes a plurality of controls arranged in a pattern that facilitates recognition by the exerciser of a correspondence between each of the controls and a corresponding region of the exerciser's body, whereby adjustment of the control causes adjustment of a characteristic of the cooling air applied to the corresponding region of the exerciser's body.

16. The apparatus of claim **15**, wherein the pattern resembles an outline of at least a portion of a human body.

17. The apparatus of claim **1**, further comprising a warm air source capable of supplying warm air to the exerciser.

18. The apparatus of claim **1**, further comprising a cooling air output able to supply cooling air to a second apparatus for convenient centralized control of a second personal cooling environment of a second exerciser by the second exerciser while exercising.

19. The apparatus of claim **1**, wherein the cooling air source is built into the stationary exercise device.

20. The apparatus of claim **1**, wherein the cooling air source is external to the stationary exercise device.

21. The apparatus of claim **1**, wherein the cooling air source is a room air conditioner in airflow communication with the plurality of air outlets via an adaptor, the adaptor being able to collect cooling air from the room air conditioner, and able to facilitate movement of the cooling air to the plurality of air outlets.

22. The apparatus of claim **21**, wherein the adaptor includes a booster fan, the booster fan being able to increase at least one of flow rate and pressure of the cooling air directed from the room air conditioner to the plurality of air outputs.

23. The apparatus of claim **1**, wherein the cooling air source is capable of providing cooling air to a thermally conductive surface that can come into thermal contact with at least a portion of the exerciser during exercise.

24. The apparatus of claim **23**, wherein the thermally conductive surface is at least a portion of one of:

a seat;

a backrest; and

a hand grip.

25. The apparatus of claim **1**, wherein the cooling air source is able to supply cooling air to a plurality of stationary exercise devices, the cooling air being supplied at a pressure and a flow rate which can meet the cooling requirements and preferences of exercisers using at least some of the stationary exercise devices.

26. The apparatus of claim **1**, further comprising:

at least one conductive cooling applicator capable of providing cooling by thermal conduction due to a flow of cooling air flowing within the conductive cooling applicator,

the conductive cooling applicator being in airflow communication with a cooling air source providing the flow of cooling air,

the conductive cooling applicator being located so as to at least sometimes be in thermally conductive contact with a portion of the exerciser,

the conductive cooling applicator being responsive to control signals from the control center,

the control signals causing the conductive cooling applicator to change at least one characteristic of cooling air flowing through the conductive cooling applicator,

the control center being capable of enabling the exerciser to control both conductive cooling and cooling air.

27. An apparatus for convenient centralized control of a personal cooling environment of an exerciser by the exerciser while exercising, the apparatus comprising:

at least one conductive cooling applicator, each cooling applicator being capable of providing cooling to the exerciser by thermal conduction due to a flow of cooling fluid flowing within the conductive cooling applicator,

each conductive cooling applicator being in fluid communication with a cooling fluid source providing the flow of cooling fluid,

each conductive cooling applicator being located so as to at least sometimes be in thermally conductive contact with a portion of the exerciser,

at least one conductive cooling applicator being responsive to control signals from the control center,

the control signals causing the conductive cooling applicator to change at least one characteristic of cooling fluid flowing through the conductive cooling applicator,

the control center being capable of enabling the exerciser to control at least conductive cooling.

28. The apparatus of claim **27**, further including a least one air outlet, the air outlet capable of being in fluid communication with the fluid cooling source, the cooling fluid serving to cool a flow of air flowing through the air outlet so as to provide a flow of cooling air to the exerciser,

the at least one air outlet being adjustable in response to a control signal from the control center,

the control center being easily accessible to the exerciser while exercising;

the control center generating control signals in response to input from the exerciser, the control signals causing the at least one air outlet to change at least one characteristic of cooling air flowing through the at least one air outlet.

29. The apparatus of claim **27**, wherein the cooling fluid is one of:

water, air, water with anti-freeze, and freon.

30. The apparatus of claim **27**, wherein at least one characteristic of cooling fluid is at least one of:

flow rate and flow temperature.

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