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

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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 6B
Figure 7A
Figure 8
Figure 9A

Figure 9B

Figure 9C
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CROSS-REFERENCE TO RELATED APPLICATIONS


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 health, 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 of 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 personal cooling environment of a second exerciser. In other embodiments, the cooling air output is external to 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, 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 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.
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.

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.

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.

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 encourages certain obese people to exercise effectively, helping them to lose weight.

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

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;

FIG. 2A 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;

FIG. 2B 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;

FIG. 2C 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;

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;

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

FIG. 4B 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;

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

FIG. 5A 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;

FIG. 5B 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;

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

FIG. 5D 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;

FIG. 5E 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;

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

FIG. 6B is a front view of the control center of FIGS. 6A and 6B;

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

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;

FIG. 9A 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;

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

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

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

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

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;

FIG. 12A 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;

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

FIG. 12C is a side view of the two flow directors of FIG. 12A, 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;

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;

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;

FIG. 15 is a perspective view of a stationary exercise device having a room air conditioner adapter, showing the adapter 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

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

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.

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.

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.

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.

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 cooling 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.

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.

In the preferred embodiment of FIG. 2A, the apparatus includes an air cooler 200 that is not attached to the stationary exercise device 102. The air cooler 200 supplies cooling air through a hose 202 to a fan 204 that is attached to the stationary exercise device 102. As in FIG. 1, the fan 204 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. 2B illustrates an embodiment similar to the embodiment of FIG. 2A, except that the fan 204 is built into the stationary exercise device 102.

FIG. 2C 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 through a hose 202 and through a conduit in the body of the stationary exercise device 102 to a series of cooling air outlets 204A-1 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 204A-1 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. 2B, except that the cooling air source is located outside of the room and supplies cooling air that is also dry air. The cold, dry air is supplied through a connection 300 in the wall of the room through a cooling 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. 4A and FIG. 4B are functional diagrams that illustrate cooling fluid applicators in two respective preferred embodiments. In FIG. 4A, 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. 4B, 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. 4C is a functional diagram that illustrates the injection of a cooling mist 420 into the cooling air 400 of FIG. 4A. Water travels through a hose 422 to a spray nozzle 424, which transforms the water into mist droplets 426. The droplets enter a mixing chamber 428 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. 5A, 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. 4B. 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. 5B uses a liquid chiller 500 similar to the chiller 500 of FIG. 5A, but the chilled liquid is supplied to conductive cooling apparatus 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 apparatus, without any cooling air outlets and/or fans to provide convective cooling. These conductive cooling apparatus can be controlled by the control center by controlling the flow of the cooling liquid to the conductive cooling apparatus, just as the air outlets are controlled by the control center so as to control flows of chilled air.

[0075] FIG. 5C is a cross-sectional diagram that illustrates the cooling of the handles in the preferred embodiment of FIG. 5D 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 apparatus 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 apparatus 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. 5C) uses a liquid chiller 500 similar to the chiller of FIG. 5A, but the chilled liquid is supplied to cooling air outlets 504A-D, wherein ice is cooled by the chilled liquid in a manner similar to the outlet of FIG. 4B, the plurality of cooling air outlets 504A-504D 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. 5D 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 504A-504D, and of each of the conductive cooling apparatus 514, 516, 518, without requiring the exerciser 508 to interrupt his exercise session.

[0078] With reference to FIG. 6A, 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 610A-I, each cooling air outlet 610A-I being connected to the cooling air input 606, each cooling air outlet 610A-I being at least attached to the stationary exercise device 604, each cooling air outlet 610A-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 610A-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 610A-I, and thereby enable the exerciser 602 to control the one or more cooling air outlets 610A-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.
In the embodiment of FIG. 6A, 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 610A-I, each of which is directed to a different region of the exerciser’s body 602. Some of the cooling air outlets 610A-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 610D-I are built into the stationary exercise device 604.

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 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.

FIG. 6B illustrates a preferred embodiment similar to FIG. 6A, 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. 6B for clarity of illustration.

FIG. 7A is a front view of the control center 614 of FIGS. 6A and 6B. 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 610A-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 617 for adjusting the direction of the cooling airflow from the outlet 617.

FIG. 7B illustrates the interior of the panel 616 of FIG. 7A 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. 7A. From the valves 712, the cooling air flows through pipes 714 to cooling air outlets 610A-I.

FIG. 8 illustrates a control center 614 in an embodiment similar to FIG. 7A, 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.

FIG. 9A 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.

In FIG. 9A, the louvers 900 are shown directing the cooling air 612 slightly downward. In FIG. 9B, the cooling air outlet 610 of FIG. 9A is shown with the central wire 906 of the coaxial cable 908 slightly withdrawn, causing the louvers 900 to direct the cooling air 612 slightly upward. And in FIG. 9C, 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.

FIG. 10A 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. 10A 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. 9A through 9C. 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.

As illustrated in FIGS. 10B and 100, extension of the central wire 906 of the coaxial cable 908 pushes the cooling air 610 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.

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.

FIGS. 12A through 12C 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. 12A through 12C for clarity of illustration. If cooling air is only supplied to the upper flow director 1100, as shown in FIG. 12A, 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. 12B, well focused air 1110 emerges in a slightly downward direction.

If cooling air is supplied equally to both flow directors 1100, 1102, as illustrated in FIG. 12C, 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.

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 supplied by the cooling air outlet 610 to the body of the exerciser 602.
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.

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 cooling 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 cooling 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.

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 1600A, 1600B in its upper structure which can direct cooling air toward the face of an exerciser, a plurality of cooling air vents along its base 204A-H which can direct cooling air upward toward the exerciser from below, and a plurality of cooling air outlets 1604A-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.

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 1600A, 1600B, 204A-H, 1604A-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.

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.

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 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 outlets.

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 airflow 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 at 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,
   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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