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(54) Cooling garment

(57) A cooling garment has a garment body covered by a length of tubing, and a cooling unit that circulates a cooling fluid through the length of tubing via the pair of connector/valve assemblies. Each connector/valve assembly has a first valve housing with a tubing connector adapted to operably engage an inlet or outlet end of the tubing, and a first connector. The connector/valve assembly further includes a first valve element for controlling fluid flow from the tubing connector, through the first valve housing, to the first connector. A second valve housing having a unit connector is adapted to operably engage the cooling unit, and a second connector is adapted to operably engage the first connector of the first valve housing. A second valve element is provided for controlling fluid flow from the second connector, through the second valve housing, to the second connector.

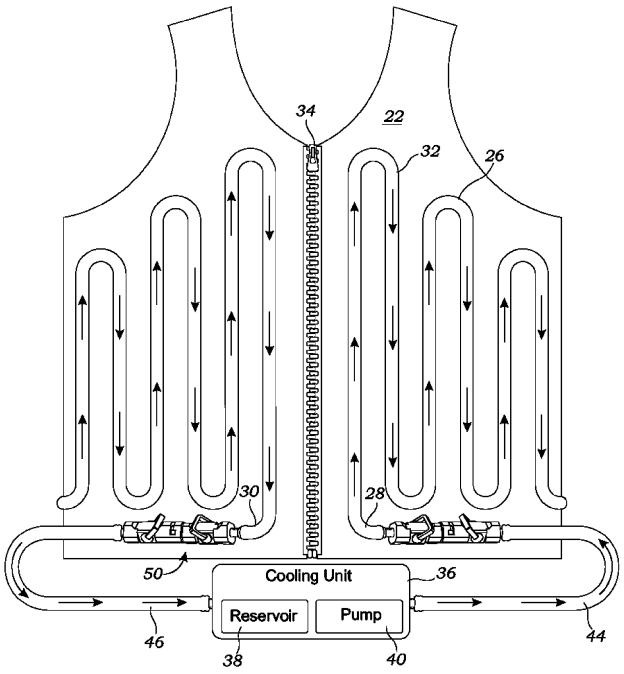

FIG. 1

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Description

FIELD OF THE INVENTION:

[0001] This invention relates generally to cooling garments, and more particularly to cooling garments that enable a user to cease and contain the flow of cooling fluids to prevent leaks and spills when the garment is removed from the user's person.

DESCRIPTION OF RELATED ART:

[0002] The following art defines the present state of this field:

[0003] Laxo, U.S. 3,743,012 (1973), teaches a controlled temperature garment using the counter flow heat exchanger principle to maintain an equal temperature distribution along the inner surface of the garment. Three layers of material are bonded together in such a manner as to provide flow channels along the garment. The garment comprises distribution, turning and collection chambers at each end of the channels; and a fluid discharge and collecting manifold to control the flow of the temperature controlling fluid.

[0004] Gammons, U.S. 2007/0085340, teaches a cooling garment that includes a cooling apparatus. The apparatus includes cooling tubing that include quick-release connectors for connecting the garment with a thermal unit.

[0005] Dean U.S. 6,349,412, teaches a medical cooling vest that includes a sealed, coolant receiving space through which coolant may pass. A source of liquid coolant at ambient pressure is connected to the space and a suction producing device is connected to an outlet for the space for drawing coolant from the source through the space at sub-atmospheric pressure, so that coolant will not leak from the vest in the event a leak develops. The vest may be formed of two flexible membranes sealed to each other to define the space.

[0006] Butzer, U.S. 6,109,338, teaches a garment (e.g., jacket, pants) for use in cooling body temperature. The garment has a body section adapted to receive a portion of the torso of the wearer and extensions from the body section to receive the wearer's limbs, and includes a system for circulating temperature controlling fluid from a suitable source through patches removably received in pockets in each of body section and extensions.

[0007] Larsen, U.S. 4,998,415, teaches a body cooling apparatus that includes a compressor and a condenser which feeds liquid coolant to a flexible tube network which is held adjacent the body to be cooled. The cooling takes place by the boiling of the liquid within the flexible tube network. The flow of liquid into the network is controlled depending upon the amount of cooling needed.

[0008] Zafred, U.S. 4,738,119, teaches a cooling garment for protection against heat stress. The cooling garment includes a pair of separate linings stitched together to form tube-receiving chambers which microporous tubes are detachably connectable to a source of liquid carbon dioxide which converts to a solid phase and then gradually sublimates to carbon dioxide gas that is released into the chambers for cooling a wearer of the article of clothing, and the article being untethered to the source of liquid carbon dioxide when worn.

[0009] Szczesuil et al., U.S. 5,320,164, teaches a body heating/cooling garment which utilizes fluid-carrying tubes and provides both air and vapor permeability to promote convective heat transfer while also providing conductive heat transfer. Critically, the garment includes adhesive dots that secure the tubing without interfering with permeability through the garment.

[0010] Other references of interest include Jenkins, U.S. 6,942,015, How et al., U.S. 2003/0167559, Pirkle, U.S. 5,533,354, Rose et al., U.S. 5,755,275, Shegerin, U.S. 6,584,798, Szczesuil et al., U.S. 6,979,382, Mandin et al., U.S. 5,214,926, Hayashi U.S. 3,630,039, Weber, U.S. 5,970,519, Naaman, U.S. 7,117,687, Szczesuil et al., U.S. 6,901,608, Pasternack, U.S. 4,286,439, Steele et al., U.S. 5,484,448, and Rankin U.S. 6,260,201.

[0011] The above-described references are hereby incorporated by reference in full.

[0012] The prior art teaches various garments that use semi-contained fluid to regulate body temperature. However, the prior art does not teach a connector/valve assembly that will enable a user to disengage the cooling garment while preventing troublesome leaks and spills. Furthermore, because the fluid is completely contained within the cooling garment, it becomes unnecessary with the present invention to refill the cooling garment with fluid, thereby enabling the user to reengage the cooling garment without procuring cooling fluid, which may not be readily available to the user. The present invention fulfills these needs and provides further related advantages as described in the following summary.

SUMMARY OF THE INVENTION

[0013] The present invention teaches certain benefits in construction and use which give rise to the objectives described below.

[0014] The present invention provides a cooling garment that has a garment body covered by a length of tubing. The tubing includes an inlet end, an outlet end, and a medial portion. A pair of connector/valve assemblies are attached to the ends of the tubing. Each connector/valve assembly has a first valve housing with a tubing connector adapted to operably engage the inlet or outlet end of the tubing, and a first connector. The connector/valve assembly further includes a first valve element for controlling fluid flow from the tubing connector, through the first valve housing, to the first connector. A second valve housing having a unit connector is adapted to operably engage a cooling unit, and a second connector is adapted to operably engage the first connector of the first valve housing. A second valve element is pro-

vided for controlling fluid flow from the second connector, through the second valve housing, to the second connector. The cooling unit is configured to circulate a cooling fluid through the length of tubing via the pair of connector/valve assemblies.

[0015] A primary objective of the present invention is to provide a cooling garment having advantages not taught by the prior art.

[0016] Another objective is to provide a cooling garment that prevents leakage of cooling fluid when the user disengages the cooling unit from the garment body to divest himself or herself of the cooling garment.

[0017] A further objective is to provide a cooling garment that enables the user to preserve the cooling fluid inside the garment and the cooling unit so that continued use of the cooling garment is possible even when replacement fluid is unavailable.

[0018] Other features and advantages of the present invention will become apparent from the following more detailed description, taken in conjunction with the accompanying drawings, which illustrate, by way of example, the principles of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0019] The accompanying drawings illustrate the present invention. In such drawings:

FIGURE 1 is a perspective view of a cooling garment;
FIGURE 2 is a front perspective view thereof illustrating a user wearing the cooling vest;
FIGURE 3 is a rear perspective view thereof;
FIGURE 4 is an exploded perspective view of a connector/valve assembly of the cooling vest;
FIGURE 5 a perspective view of the connector/valve assembly;
FIGURE 6 is a sectional view thereof taken along line 6-6 in Figure 5, illustrating valve elements in a closed configuration; and
FIGURE 7 is a sectional view as in Figure 6, illustrating valve elements in an open configuration.

DETAILED DESCRIPTION OF THE INVENTION

[0020] The above-described drawing figures illustrate the invention, a cooling garment 10 that is adapted to cool a user 14 during hard work and/or while operating in a hot environment. The cooling garment 10 is particularly well suited for use by athletes in active and/or athletic competitions, such as motorcycle riding and other sports.

[0021] Fig. 1 is a front perspective view of one embodiment of a cooling garment 10. Fig. 2 is a front perspective view thereof illustrating a user 14 wearing the cooling garment 10. Fig. 3 is a rear perspective view thereof. As shown in Figs. 1-3, the cooling garment 10 comprises a garment body 20 that is adapted to be worn by the user 14. In the embodiment of Figs. 1-3, the garment body 20 is a vest; however, in alternative embodiments, the garment body 20 may be in the form of other articles of clothing adapted to be worn by the user 14 (e.g., pants, jackets, hats, helmets, etc.).

[0022] The garment body 20 includes a front portion 22 and an opposing back portion 24. A length of tubing 26 is affixed to the garment body 20. The length of tubing 26 may be attached to the front and/or back portions 22 and 24 (e.g. bonding, welding, or otherwise sewn or affixed thereto), or may be integrally formed within the garment body 20. The length of tubing 26 has an inlet end 28, an outlet end 30, and a medial portion 32. While a single tube is illustrated, multiple tubes, conduits, or other related structures may also be used, and are hereby defined to be within the scope of the term "tubing." In one embodiment, the length of tubing 26 is welded to the garment body 20 in a serpentine pattern; however, the tubing 26 may also be sewn or otherwise attached or integrally formed with the garment body 20, and may also be arranged in any alternative pattern such that provides adequate coverage over the garment body 20.

[0023] In the embodiment of Figs. 1-3, the garment body 20 may include a closure 34, such as a zipper closure, for facilitating removal of the cooling garment 10, however, other closures well known in the art may be used and should be considered within the scope of the invention.

[0024] As shown in Figs. 1-3, the cooling garment 10 further includes a pair of connector/valve assemblies 50, and a cooling unit 36 configured to circulate a cooling fluid 12 through the length of tubing 26 via the pair of connector/valve assemblies 50.

[0025] In one embodiment, the cooling unit 36 may include a reservoir 38 for storing the cooling fluid 12, and a pump 40 that is adapted to pump 40 the cooling fluid 12 through the tubing 26. The reservoir 38 may be, for example, a plastic bag or similar container that may be sealed to contain the cooling fluid 12. The pump 40 may be electronically or manually powered, and may be any form of pump known in the art, as illustrated in Fig. 3, the reservoir 38 and the pump 40 may be stored and carried in a waist pack or packs 42 (i.e., a fanny pack), a backpack or pouch, or other similar conveyance.

[0026] In one embodiment, the cooling fluid 12 is ice water that is conveyed by the pump 40 through the length of tubing 26, effectively cooling the user 14. As the ice in the reservoir 38 melts, it merely adds to the supply of water in the cooling garment 10, and if needed, the user 14 may drink the water for hydration, especially in the event of an emergency.

[0027] The cooling garment 10 cools the user 14 when the ice water 12 stored in the reservoir 38 is pumped via the pump 40 through pump tubing 44 to the connector/valve assembly 50 where it is then conveyed into and through the length of tubing 26. The ice water 12 then exits the tubing 26 through reservoir tubing 46 and returns to the reservoir 38 of the cooling unit 36. The cooling fluid 12 flows in a continuous loop through the cooling unit 36,

the connector/valve assemblies 50, and the length of tubing 26 until the user 14 deactivates the pump 40 and ceases the flow of the ice water 12.

[0028] Fig. 4 is an exploded perspective view of the connector/valve assembly 50. Fig. 5 a perspective view thereof. Fig. 6 is a sectional view thereof taken along line 6-6 in Figure 5, illustrating the connector/valve assembly 50 in a closed configuration, and Fig. 7 is the sectional view of Figure 6, illustrating connector/valve assembly 50 in an open configuration.

[0029] As shown in Figs. 4-7, each connector/valve assembly 50 has a first valve housing 52 and a second valve housing 70 that may be quickly and easily interlocked using first and second connectors 78 and 82, described in greater detail below.

[0030] The first valve housing 52 may be any form of housing defining a conduit 54 or some form of hollow chamber through which the cooling fluid 12 may pass. The first valve housing 52 includes a unit connector 56 for operably connecting the first valve housing 52 with the cooling unit 36, and a first connector 78 for connecting the first valve housing 52 with the second valve housing 70, as described in greater detail below. In one embodiment, the unit connector 56 is a fitting such as a tubing barb that removably engages the pump tubing 44 that is operably connectable with the pump 40. While one embodiment of the unit connector 56 is illustrated herein, alternative or equivalent embodiments known in the art may also be utilized, and should be considered within the scope of the present invention.

[0031] The first valve housing 52 also includes a first valve element 58 for regulating the flow of the fluid 12 through the first valve housing 52. In the embodiment of Figs. 4-7, the first valve element 58 may be a barrel valve 58 having a barrel 60 rotatably mounted within the first valve housing 52. The barrel 60 includes an outer surface 64 and two ends 66, and a conduit 62 extends therethrough. While a barrel valve 58 is used in the present embodiment, other suitable valves known in the art may also be utilized, and should be considered within the scope of the present invention.

[0032] The first valve housing 52 may also include a first actuator 68 for operably controlling the first valve element 58. In one embodiment, the first actuator 68 may be a lever or similar element (e.g., knob, pin, screw, etc.) for operably controlling the position of the barrel 60 in the present embodiment of the first valve element 58 (or operably controlling any other form of valve). In one embodiment, the first actuator 68 may be a generally U-shaped lever with each end attached to one of the ends 66 of the barrel 60 of the first valve element 58.

[0033] The second valve housing 70 may be substantially similar to the first valve housing 52, and may include a tubing connector 72, a second connector 82, a second valve element 74, and a second actuator 76. The tubing connector 72 may be a fitting such as a tubing barb, or equivalent connector, as described above. The second connector 82 is adapted to removably engage the first connector 78.

[0034] As shown in Figs. 4-7, in one embodiment the first connector 78 is a female receiver with a locking channel 80 that removably engages the second connector 82, which may be a male element which may include a locking tab 84 extending outwardly for engaging the locking channel 80 of the first connector 78. The male element 82 and the locking tab 84 removably engage the female receiver 78 and the locking channel 80 in order to secure the first valve housing 52 to the second valve housing 70. While the described elements represent one embodiment of the first and second connector 82s, alternative structures (e.g., threaded engagement, various frictional fits, snaps, locking arms and element, etc.) known to those skilled in the art may be used to establish the removably connection, and such alternatives should be considered within the scope of the present invention.

[0035] As shown in Figs. 4 and 5, the second valve element 74 may also be the barrel valve 58 described above for controlling the fluid flow from the second connector 82, through the second valve housing 70, to the tubing connector 72. The second actuator 76 may be of similar construction as described above, or may include another form of actuator known in the art.

[0036] When the cooling garment 10 is not being worn, or when the user 14 wishes to remove the cooling garment 10, it is first necessary to cease the flow of fluid as well as contain the fluid. If the cooling garment 10 is being used, the user 14 first turns off the pump 40. As illustrated in Fig. 6, the first and second actuators 68 and 76 of each of the connector/valve assemblies 50 are turned to a closed configuration, thus causing the first and second valve elements 58 and 74 to block the flow of fluid so that the fluid is contained within the cooling garment 10.

[0037] In the embodiment of Fig. 6, the barrel 60 blocks the flow of fluid. The first and second connectors 78 and 82 may then be disconnected from each other, thereby enabling the garment body 20 to be removed from the user 14, and the cooling unit 36 may be removed separately. The cooling fluid 12 is contained within the tubing 26 and the cooling unit 36, cannot spill or be lost. If the cooling garment 10 is needed again, it can be donned and the first and second connectors 78 and 82 may be reconnected for further use.

[0038] As illustrated in Fig. 7, when the first and second actuator 68 and 76 are moved by the user 14 to the open configuration, the first and second actuators 68 and 76 manipulate the barrels 60 of the first and second valve elements 58 and 74 to allow the flow of cooling fluid 12 to proceed throughout the length of tubing 26 attached to the cooling garment 10 and through the cooling unit 36. The pump 40 of the cooling unit 36 pumps the cooling fluid 12 through the tubing 26. The cooling fluid 12 (e.g. water) is cooled by the ice in the reservoir 38, and melting water from the ice increases the supply of the cooling fluid 12.

[0039] When the user 14 wishes to remove the cooling garment 10 and cease the flow of fluid 12 as well as

contain the fluid 12, the user 14 again turns off the pump 40 and turns the first and second actuator 68 and 76 of each of the connector/valve assemblies 50 to the closed configuration of Fig. 6, thus causing the barrels 60 of the first and second valve elements 58 and 74 to block the flow of fluid 12 so that the fluid 12 is contained within the cooling garment 10. The first and second connectors 78 and 82 may then be disconnected from each other, thereby enabling the garment body 20 to be removed from the user 14, and the cooling unit 36 may be removed separately. The cooling fluid 12 is contained within the tubing 26 and the cooling unit 36, and cannot spill or be lost. If the cooling garment 10 is needed again, it can be donned and the first and second connectors 78 and 82 may be reconnected for further use.

[0040] If the cooling garment 10 is worn for a long time, and the supply of ice is exhausted, additional ice may be added to the reservoir 38. Furthermore, in the event of an emergency (e.g., a motorcycle breaking down in the middle of the desert), the user 14 may close the first and second valve elements 58 and 74 of each of the connector/valve assemblies 50 to conserve the water, and then drink the water from the tubing 26 and the reservoir 38, until help arrives.

[0041] The mere reversal of any of these elements, or exchanging them for equivalent elements, is hereby expressly defined to be within the scope of the claim terminology, and is therefore expressly within the scope of the following claims.

[0042] As used in this application, the words "a," "an," and "one" are defined to include one or more of the referenced item unless specifically stated otherwise. Also, the terms "have," "include," "contain," and similar terms are defined to mean "comprising" unless specifically stated otherwise. Furthermore, the terminology used in the specification provided above is hereby defined to include similar and/or equivalent terms, and/or alternative embodiments that would be considered obvious to one skilled in the art given the teachings of the present patent application.

Claims

1. Cooling garment utilizing a cooling fluid to cool a user, the cooling garment comprising:

   - a garment body adapted to be worn by the user;
   - a length of tubing having an inlet end, an outlet end, and a medial portion attached to the garment body;
   - a pair of connector/valve assemblies; and
   - a cooling unit configured to circulate the cooling fluid through the length of tubing via the pair of connector/valve assemblies,

   wherein each connector/valve assembly includes:

   - a first valve housing having a tubing connector adapted to operably engage the inlet or outlet end of the tubing, and a first connector;
   - a first valve element for controlling fluid flow from the tubing connector, through the first valve housing, to the first connector;
   - a second valve housing having a unit connector adapted to operably engage the cooling unit, and a second connector adapted to operably engage the first connector of the first valve housing; and
   - a second valve element for controlling fluid flow from the second connector, through the second valve housing, to the second connector.

2. Cooling garment according to claim 1, wherein each connector/valve assembly further includes a first actuator for operably controlling the first valve element and a second actuator for operably controlling the second valve element.

3. Cooling garment according to claim 1 or 2, wherein the cooling unit includes a reservoir for holding the cooling fluid, and a pump for pumping the cooling fluid through the tubing.

4. Ccooling garment according to claim 1, 2 or 3, wherein the first and second valve elements each include a barrel valve having a barrel having ends, and a conduit extending through the barrel.

5. Cooling garment according to any one of the preceding claims, wherein the first and second valve actuators are generally U-shaped levers attached at each end to the ends of the barrel.

6. Cooling garment according to any one of the preceding claims, wherein the first connector is a female receiver, and the second connector is a male element adapted to removably engage the female receiver.

7. Cooling garment according to claim 6, wherein the female receiver further includes a locking slot, and the male element includes a locking tab that engages the locking slot.

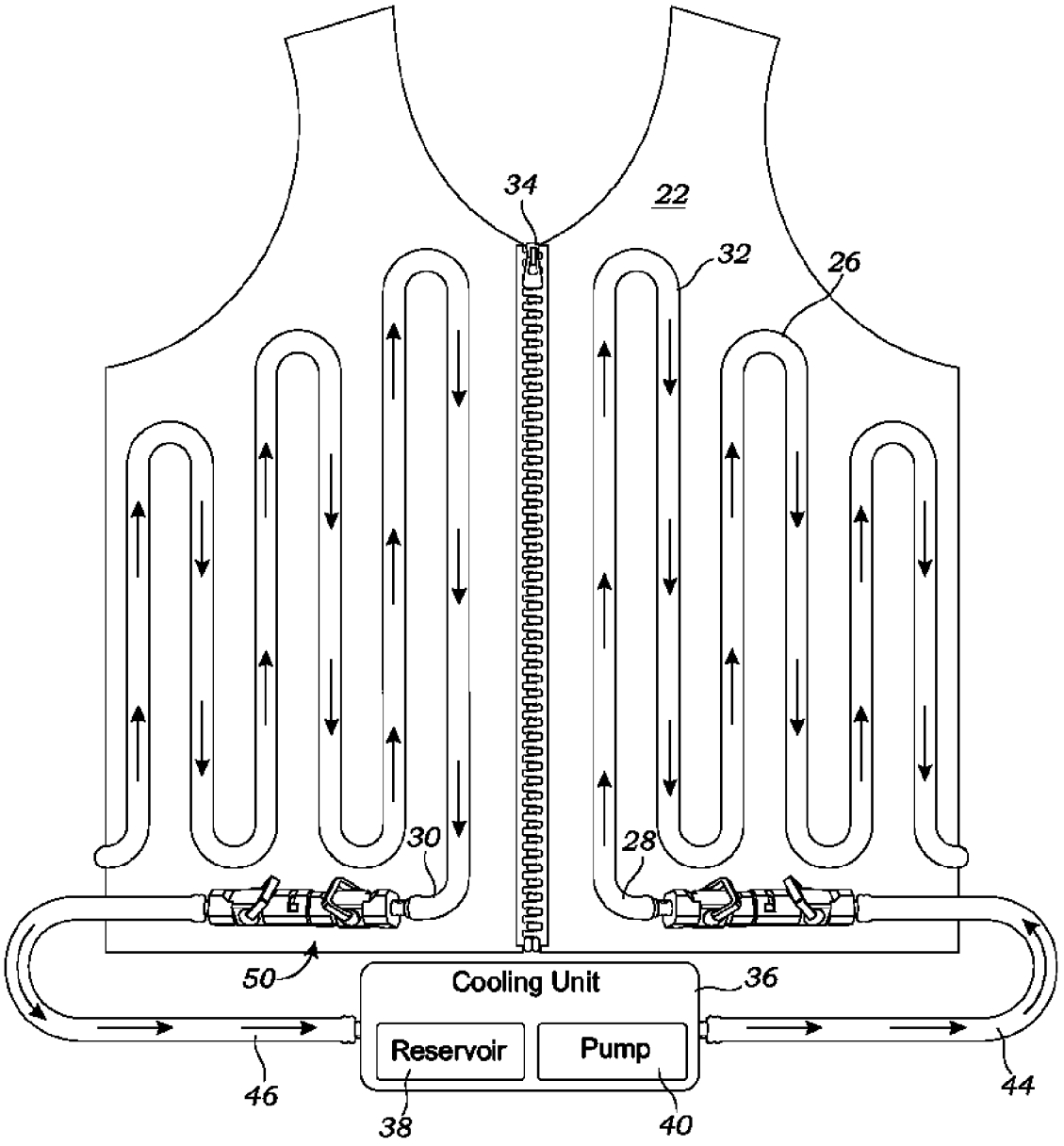

FIG. 1

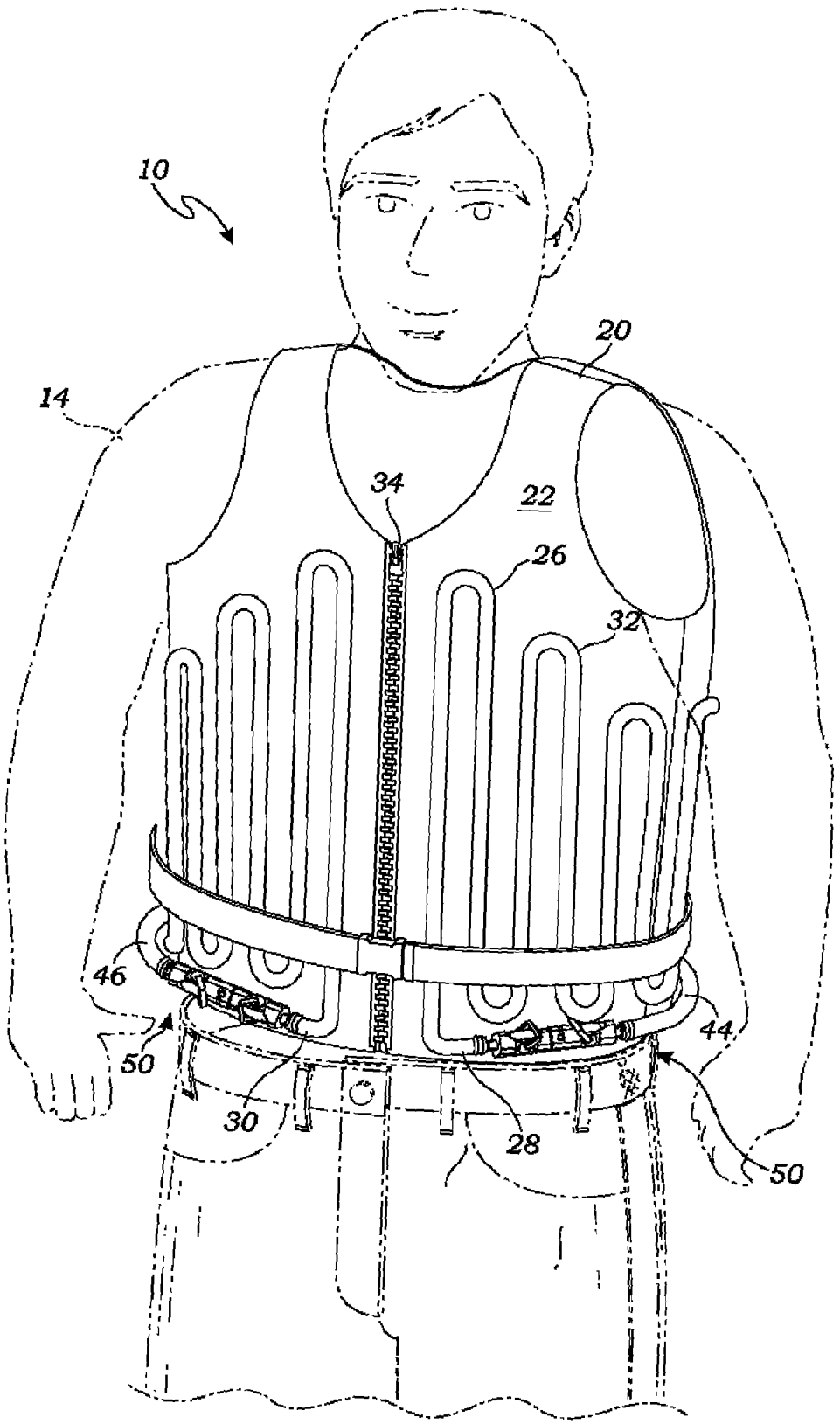

FIG. 2

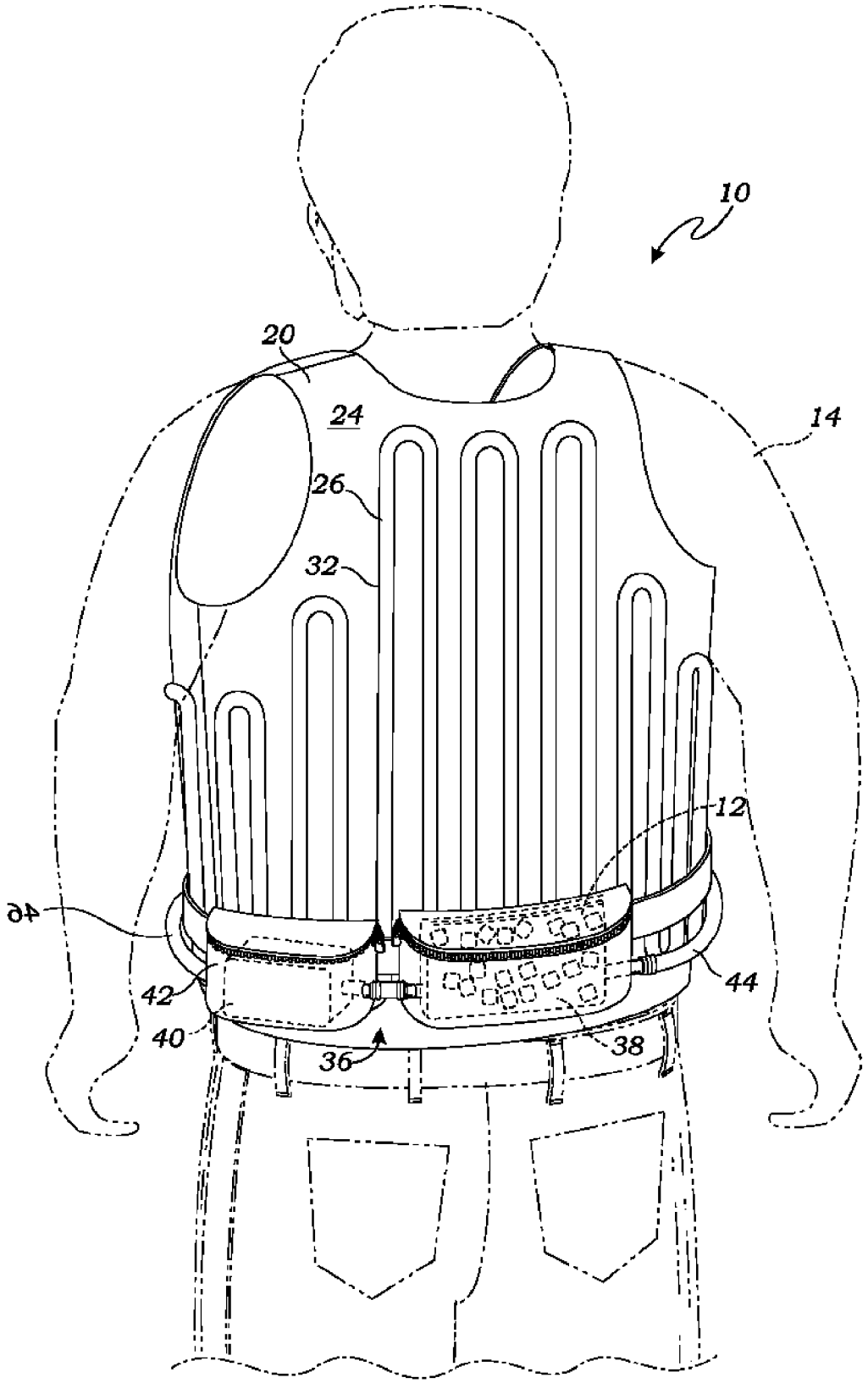

FIG. 3

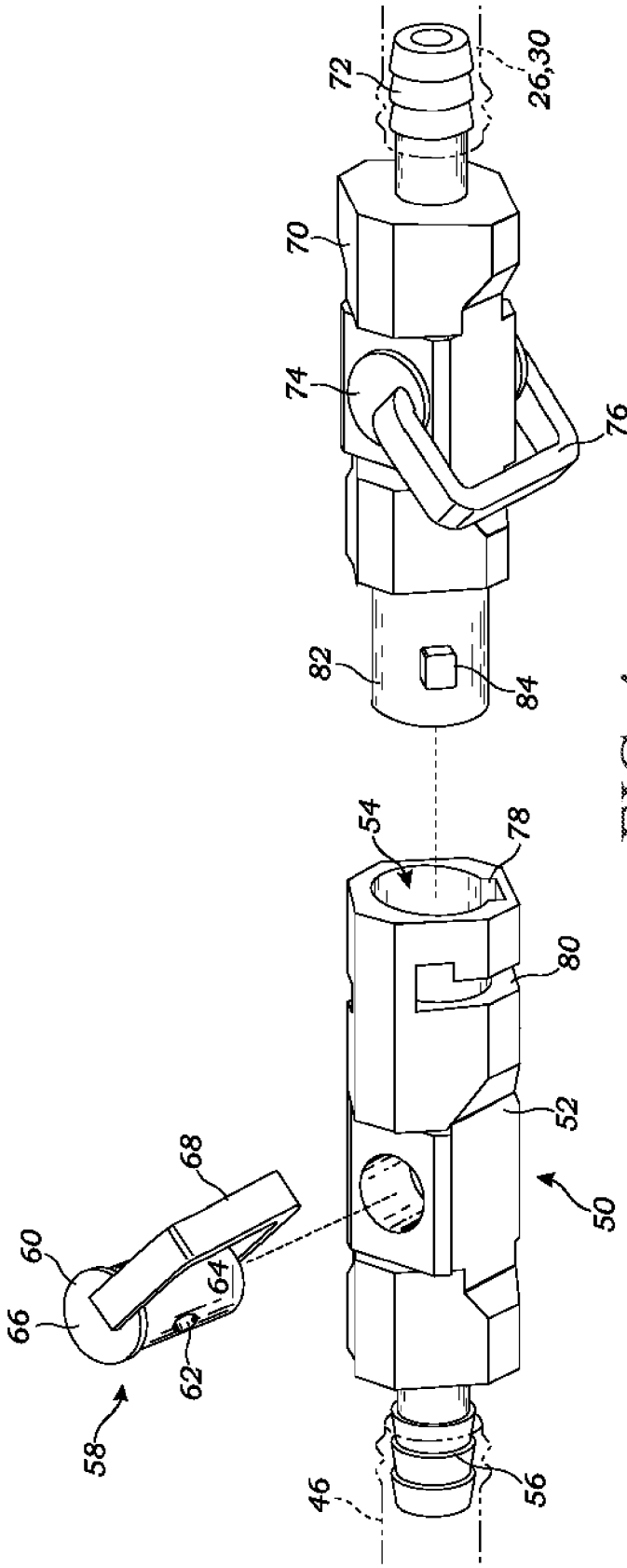
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FIG. 4

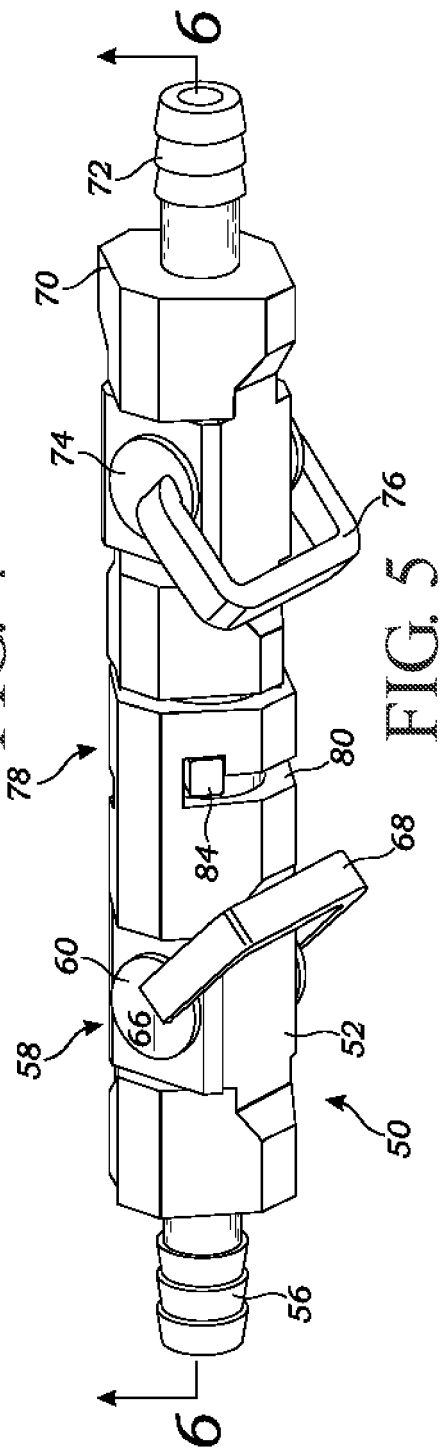
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FIG. 5

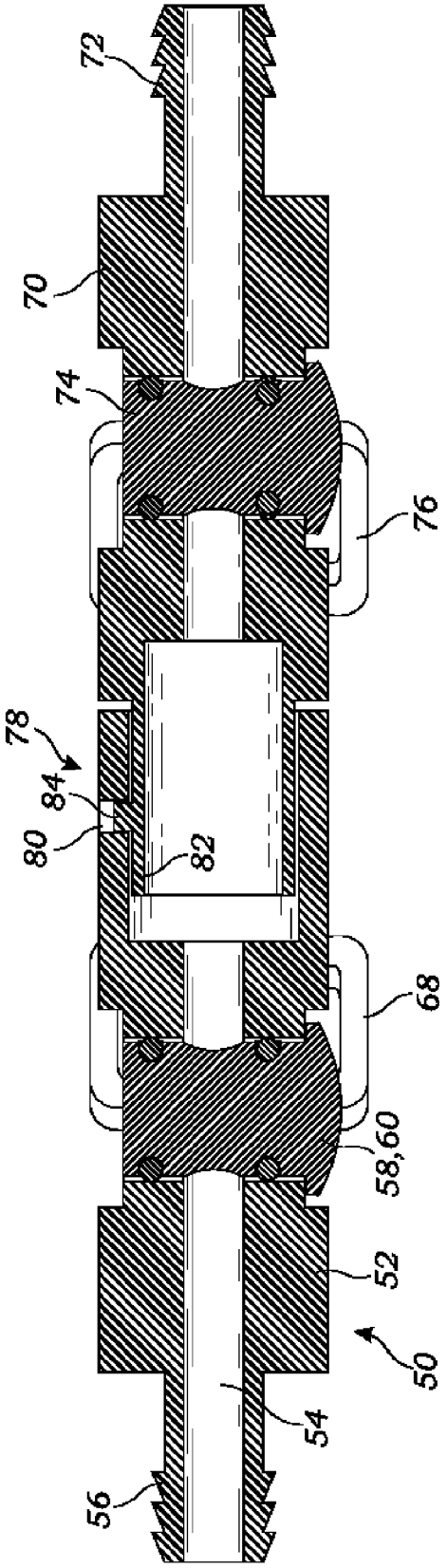
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FIG. 6

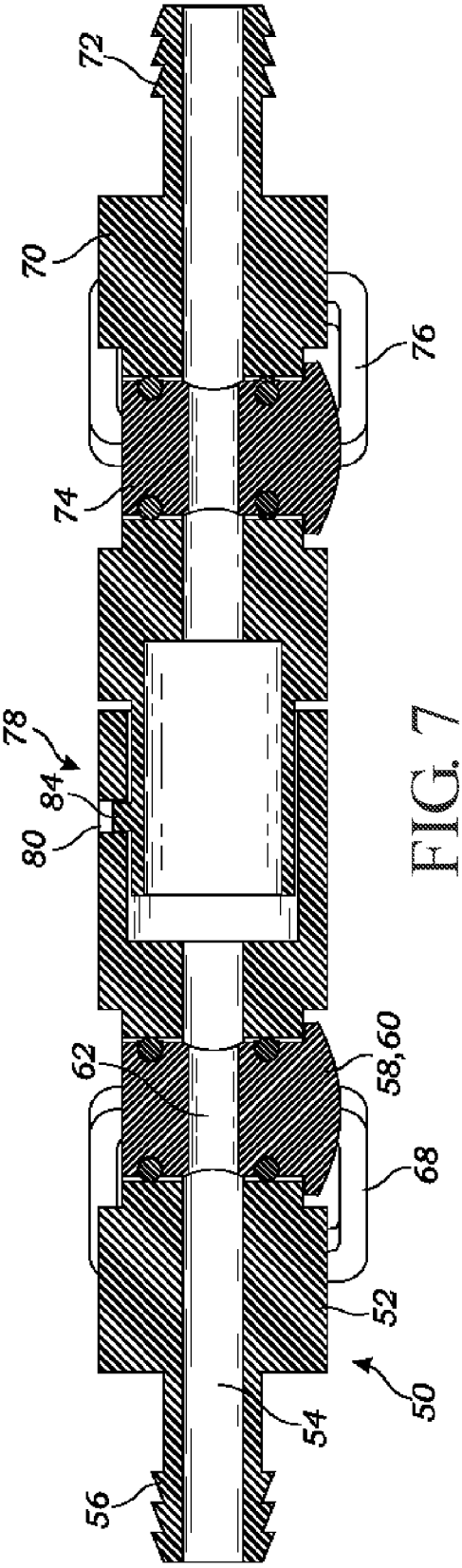
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FIG. 7

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EUROPEAN SEARCH REPORT

Application Number
EP 09 15 7815

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A41D

The present search report has been drawn up for all claims

Place of search	Date of completion of the search	Examiner
The Hague	8 September 2009	D'Souza, Jennifer

CATEGORY OF CITED DOCUMENTS

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For more details about this annex : see Official Journal of the European Patent Office, No. 12/82

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