US 20100031674A1

(19) **United States**

(12) **Patent Application Publication**

(10) **Pub. No.: US 2010/0031674 A1**

(43) **Pub. Date: Feb. 11, 2010**

Aldrich

(54) **TE LIQUID COOLER**

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(21) Appl. No.: **12/381,721**

(22) Filed: **Mar. 16, 2009**

Related U.S. Application Data

(60) Provisional application No. 61/137,954, filed on Aug. 5, 2008.

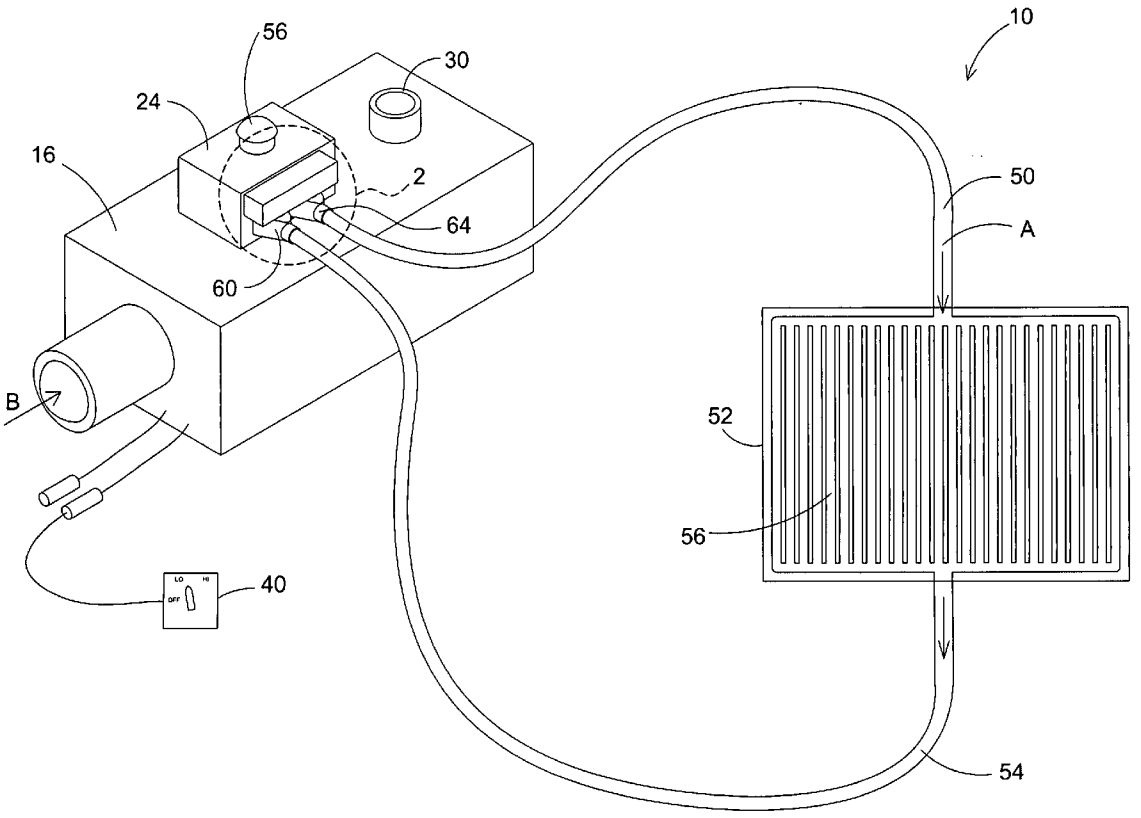
Publication Classification

(51) **Int. Cl.**
F25B 21/02 (2006.01)

(52) **U.S. Cl.** **62/3.2**

(57) **ABSTRACT**

A system for cooling fluid to cool and condition a race cart driver's suit, helmet or seat. The system includes Peltier effect thermoelectric coolers sandwiched to form water and air passages to cool liquid in use in a suit, helmet or seat and to expel waste heat. A thermoelectric cooler for cooling a driver worn device including a thermoelectric cooler having a first heat exchanger, an inlet for supplying one side of the first heat exchanger, and an inlet for air supplying an opposing side of the first heat exchanger. A pump for moving liquid from a reservoir on the TE cooler with a first heat exchanger to a second heat exchanger worn by a driver. A quick release device to detach the TE cooler from the second heat exchanger with a single motion depressing a single bar releases two quick connects.



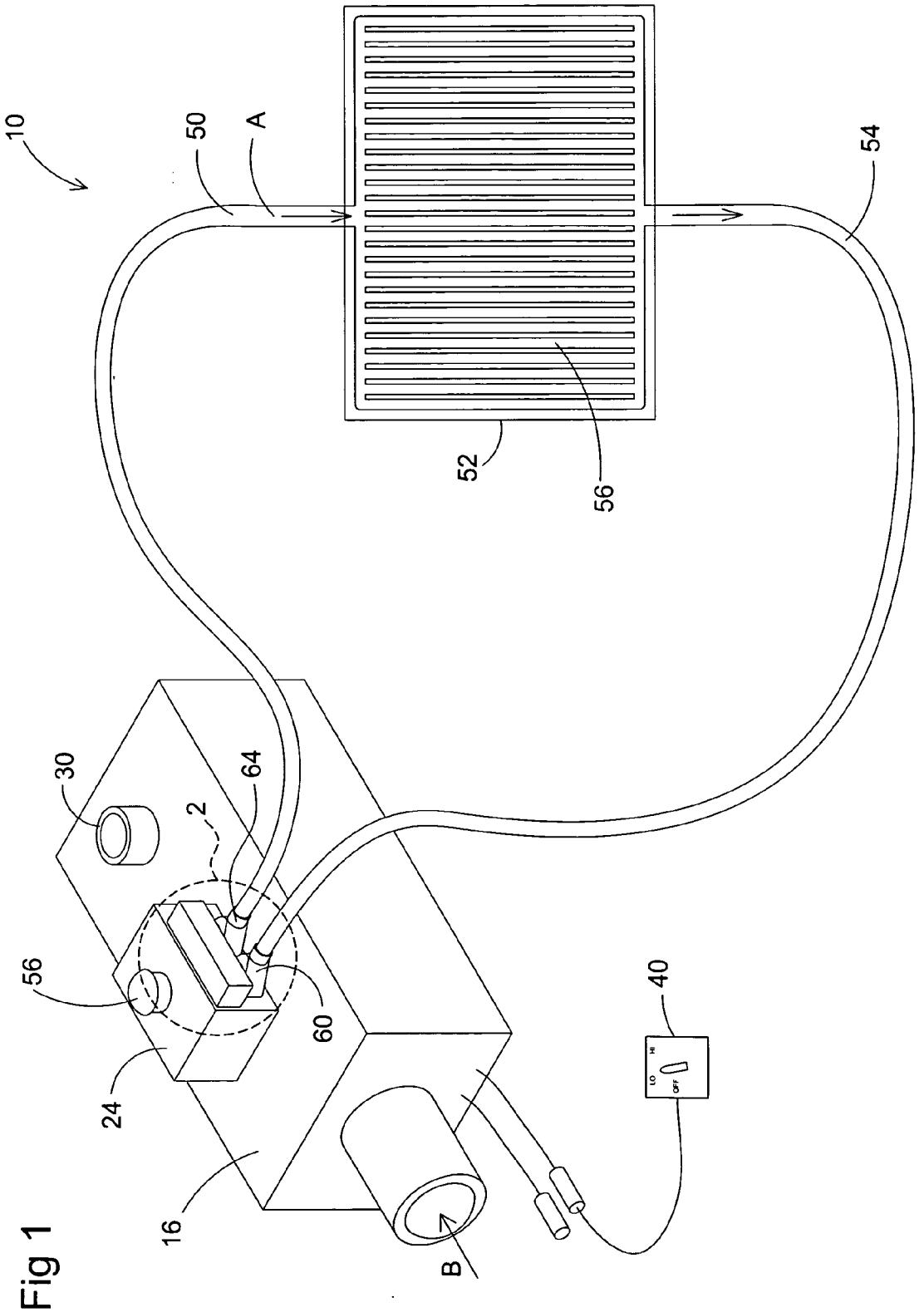


Fig 1

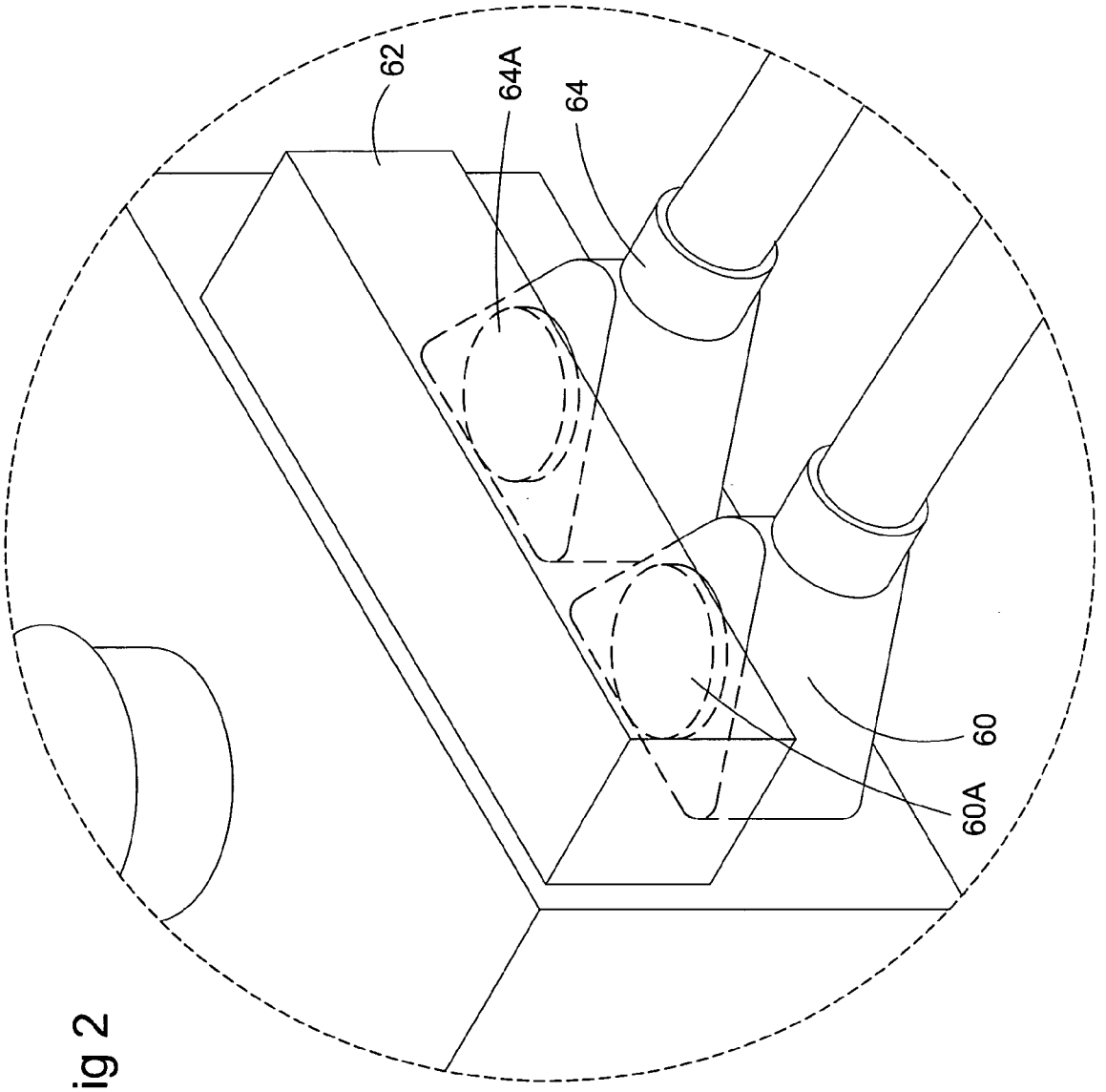


Fig 2

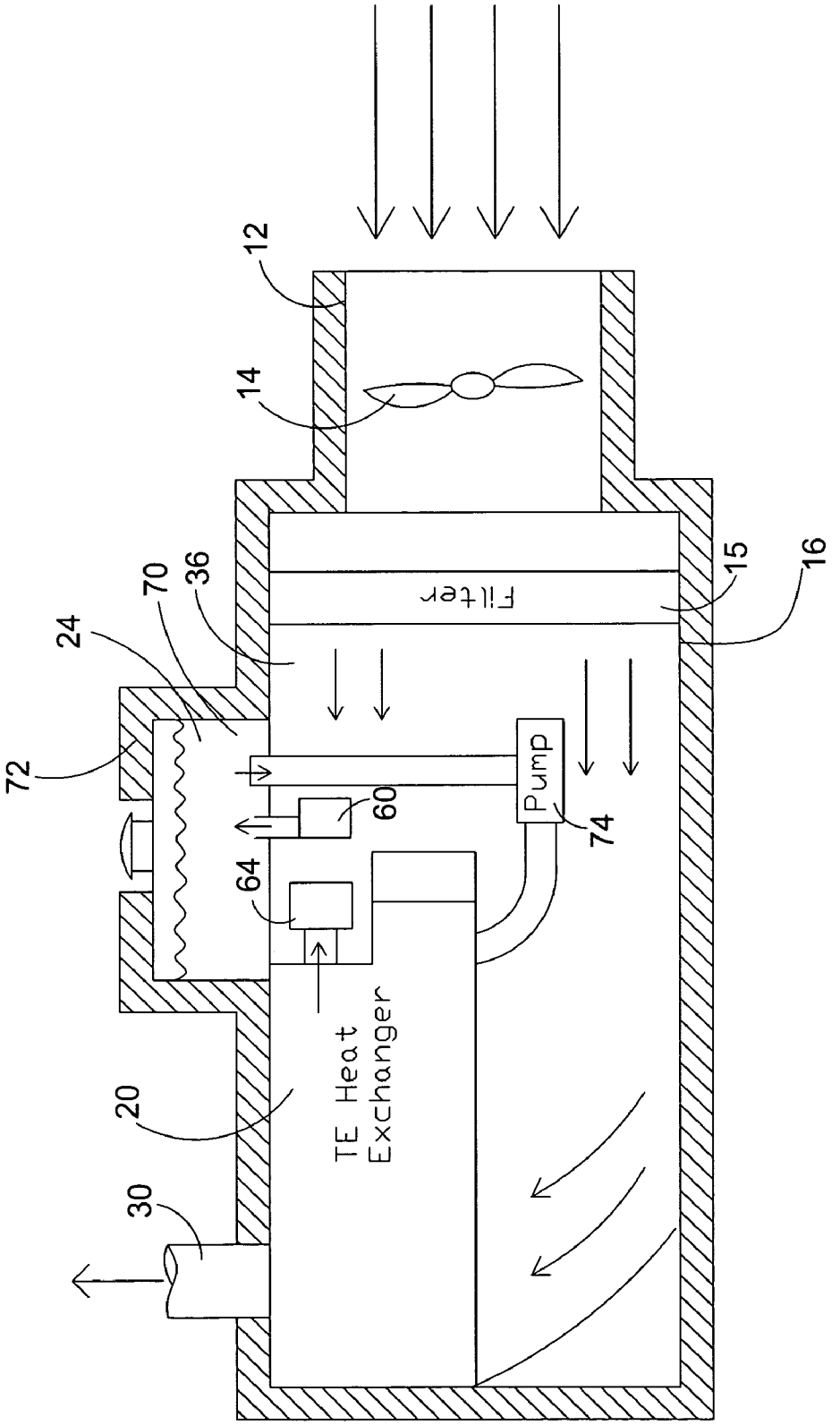

12
14
15
16
Filter
36
70
24
72
Pump
74
60
64
TE Heat Exchanger
20
30

Fig 3

TE LIQUID COOLER

BACKGROUND OF THE INVENTION

[0001] Related applications: applicant claims benefit under 25 USC 119e to U.S. provisional application 61/137,954 filed Aug. 5, 2008

[0002] In the racing industry safety has become an increasingly important issue. Most drivers now wear helmets and flame proof suits. It is known to use a liquid such as water to provide cooling within a suit.

SUMMARY OF THE INVENTION

[0003] The temperature inside a racecar can easily exceed 130 degrees F. and a race event can last several hours. The heat can be taxing upon a driver reducing performance. The present invention relates to a thermal electric cooler used to cool water that can be circulated to a driver's helmet, suit or seat. This might include circulating water to a vest or helmet for example. The thermal electric cooler works on the well known Peltier effect where heat is liberated and absorbed at the junction of two dissimilar metals when electricity is applied.

[0004] The present invention provides a portable, lightweight cooler that uses a minimum of auxiliary energy from the car engine to carry and power. Further advantages of the system will become apparent in the following detailed description of the invention.

[0005] The present invention further provides a thermal electric cooler for cooling a driver worn device including;

[0006] a thermal electric cooler having a first heat exchanger, an inlet for water or liquid supplying one side of the first heat exchanger; an inlet for air supplying an opposing side of the first heat exchanger. A pump moves water from a reservoir on the TE cooler from a first heat exchanger to a second heat exchanger worn by a driver. A quick release device the second heat exchanger to be detached from the TE cooler by making a single motion.

BRIEF DESCRIPTION OF THE DRAWINGS

[0007] FIG. **1** shows a view of the cooler system;

[0008] FIG. **2** shows details of the device of FIG. **1**; and

[0009] FIG. **3** shows a cross-section view of a portion of the device of FIG. **1**.

DETAILED DESCRIPTION OF THE DEVICE

[0010] FIGS. **1** and **3** show views of the system **10**. A portable thermalelectric cooler box **16** houses a TE cooler **18** having a heat exchanger **20** (FIG. **3**) Air is drawn through inlet **12** and is exhausted from outlet **30** after picking up waste heat from the heat exchanger **20**. A control **40** can be used to control the electrical power to the TE cooler. Power may be taken from a vehicle electrical system (not shown) for example. A liquid such as water contained in reservoir **24** is pumped through the thermoelectric heat exchanger **20** where it is cooled and then flows through line **50** as indicated by arrow "A" into a cooling device **52** adjacent to or worn by the driver such as a helmet, vest, suit or seat for example. The cooling device **52** includes a heat exchanger section **56** that will allow the cooled water or liquid to conduct heat away from a car driver and from the environment adjacent the driver. The water then returns through line **54** to the reservoir **24**. As can be seen the reservoir **24** includes a fill cap **56** to fill the reservoir with a liquid such as water. Each line **50** and **54** is connected to the cooler box **16** by a quick connect coupling **60**, **64**. FIG. **2** shows details that each line **50**,**54** is connected to the cooler box **16** by a spring loaded quick connect coupling **60**,**64**. These couplings **60**, **64** allow for an operator to press a portion **60**A, **64**A and release the line so that the portable TE cooler box **16** can be disconnected from the device **52** which the driver is likely to be wearing. A bar **62** allows for simultaneous release of both quick connections **60**, **64**. The bar **62** allows a driver to make a single release motion, simply pressing the bar **62** down depresses both release portions **60**A, **64**A.

[0011] As shown in FIG. **3**, water or liquid can flow from a reservoir **24** into the heat exchanger **20**. Inlet air is drawn in through opening **12** by fan **14** within the TE box **16**. The air can pass through an initial filter **18**, to filter out dust and particulate matter. The inlet air flows through the heat exchanger **20**. In the coils of the heat exchanger **20** water or liquid is cooled down and the air absorbs the waste heat and is expelled from the heat exchanger **20** through waste heat outlet **30**. The air from the inlet hose **12** flows through passage **36** shown in FIG. **3** and through the warm side of the thermoelectric heat exchanger **20** and into line **50** to supply device **52**. The reservoir **24** and TE cooler **16** can be partially or fully covered in insulation **72** as shown in FIG. **3**.

[0012] Though not shown it would be obvious to reverse the thermal electric units **32** physically or by switching the polarity of electricity supplied to the units so that the first portion of carbon monoxide filtered air was heated instead of being cooled. This would satisfy applications where heated water would be needed.

[0013] Though not shown it would be possible to reverse the thermoelectric unit **18** physically or by switching the polarity of electricity supplied to the units so that the water would be heated instead of being cooled. This would satisfy applications where heated water would be needed.

[0014] Though not shown it is also well known to use thermostatic controls to sense a temperature or humidity of ambient air, or of the driver or of the outlet air and to control the system based on any or all of these temperatures. Also, though not shown, it would be possible to cool a stream of air in addition to the water such that the water could cool the driver's body while the cooled air would be provided to the driver to breathe.

1. A thermoelectric cooler for cooling a driver worn device including;

a thermoelectric cooler having a first heat exchanger,

an inlet for liquid supplying one side of the first heat exchanger,

an inlet for air supplying an opposing side of the first heat exchanger,

a pump for moving liquid from a reservoir on the thermoelectric cooler to said first heat exchanger then to a second heat exchanger worn by a driver.

2. The thermoelectric cooler of claim **1** including a quick release device to detach the thermoelectric cooler from the second heat exchanger.

3. The thermoelectric cooler of claim **1** wherein said second heat exchanger is at least one of a suit, a helmet and a seat.

4. The thermoelectric cooler of claim **1** wherein said liquid is water and said water is cooled in said first heat exchanger and flows to said second heat exchanger where the water is warmed by heat from the driver and from the environment adjacent the driver.

5. The thermoelectric cooler of claim **2** wherein said quick release includes a bar that simultaneously releases a water supply line and a water return line to detach the thermoelectric cooler from the second heat exchanger such that the driver can leave the thermoelectric cooler while still wearing the second heat exchanger.

6. A thermoelectric cooler for cooling a driver including;
a thermoelectric cooler having a first heat exchanger,
an inlet for liquid supplying the first heat exchanger,
an inlet for air supplying a path through the first heat exchanger,
a pump for moving liquid from a reservoir on the thermoelectric cooler to said first heat exchanger then to a second heat exchanger to cool a driver.

7. The thermoelectric cooler of claim **6** wherein said second heat exchanger is worn by the driver.

8. The thermoelectric cooler of claim **6** wherein said liquid is water and said water is cooled in said first heat exchanger and flows to said second heat exchanger where the water is warmed by heat from the driver.

9. The thermoelectric cooler of claim **6** including at least one quick release device to detach the thermoelectric cooler from the second heat exchanger.

10. The thermoelectric cooler of claim **6** wherein said second heat exchanger is at least one of a suit, a helmet and a seat.

11. The thermoelectric cooler of claim **9** wherein said quick release includes a bar that simultaneously releases a water supply line and a water return line to detach the thermoelectric cooler from the second heat exchanger such that the driver can leave the thermoelectric cooler while still wearing the second heat exchanger.

12. A thermoelectric cooler for cooling including;
a thermoelectric cooler having a first heat exchanger,
a reservoir for liquid supplying the first heat exchanger,
an inlet for air supplying a path through the first heat exchanger,
a pump for moving liquid from the reservoir on the thermoelectric cooler to said first heat exchanger then to a second heat exchanger to cool.

13. The thermoelectric cooler of claim **12** wherein said second heat exchanger is worn by a user.

14. The thermoelectric cooler of claim **13** wherein said liquid is water and said water is cooled in said first heat exchanger and flows to said second heat exchanger where the water is warmed by heat from the user.

15. The thermoelectric cooler of claim **14** including at least one quick release device to detach the thermoelectric cooler from the second heat exchanger.

16. The thermoelectric cooler of claim **15** wherein said quick release simultaneously releases a water supply line and a water return line to detach the thermoelectric cooler from the second heat exchanger such that the user can leave the thermoelectric cooler while still wearing the second heat exchanger.

17. The thermoelectric cooler of claim **16** wherein said second heat exchanger is at least one of a suit, a helmet and a seat.

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