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(54) **THERMALLY-CONDITIONED BEVERAGE HOLDERS AND BINS**

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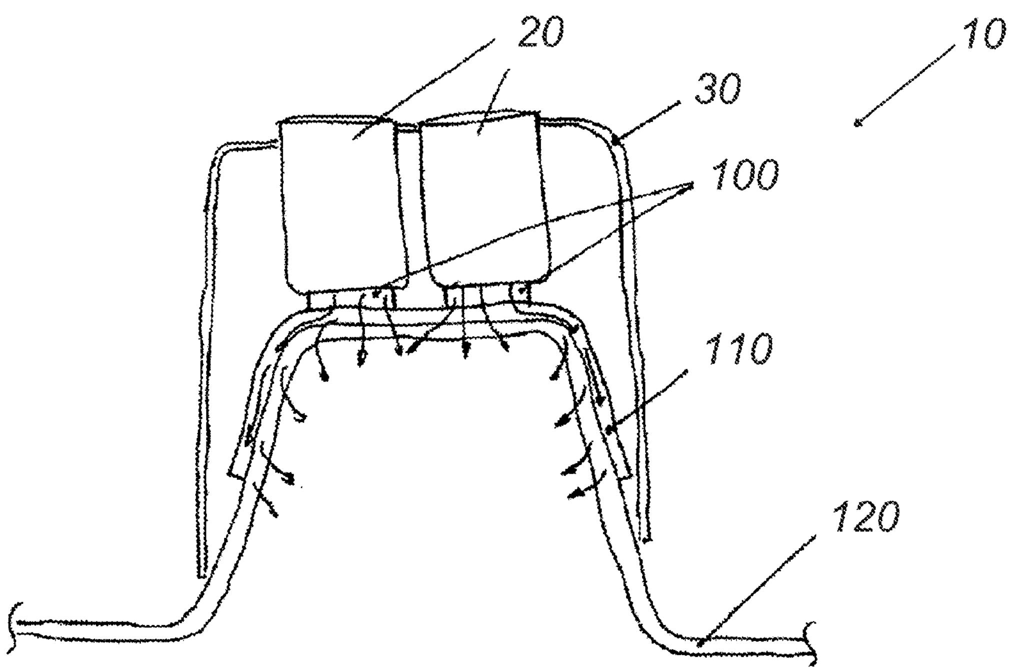
CPC ***F25B 21/02*** (2013.01); ***F25D 31/002*** (2013.01); *F25B 2321/02* (2013.01)
USPC **62/3.6**

(57) **ABSTRACT**

According to some embodiments, thermally-conditioned device comprises a receptacle configured to receive an item, the receptacle comprising a wall, the wall comprising an exterior surface, wherein the receptacle comprises at least one thermally conductive material. The thermally-conditioned device further comprises a thermoelectric device secured to the exterior surface of the wall of the receptacle, and a liquid-loop heat exchange system comprising a cold plate adjacent the thermoelectric device, wherein the thermoelectric device is positioned between the wall of the receptacle and the cold plate, wherein the thermoelectric device is thermally conductive with both the receptacle and the cold plate.



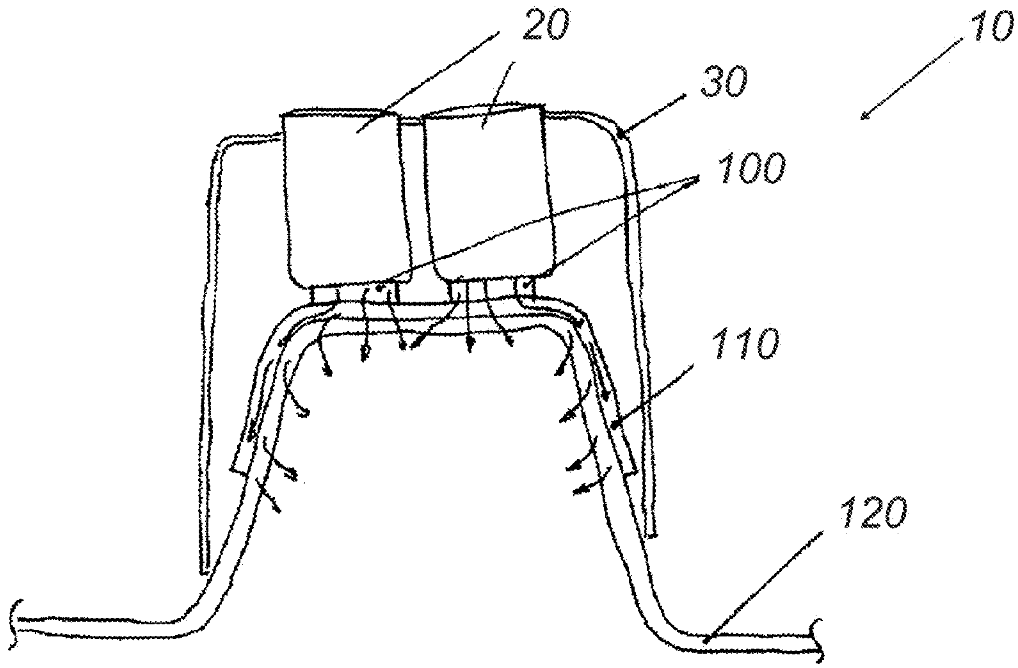


FIG. 1

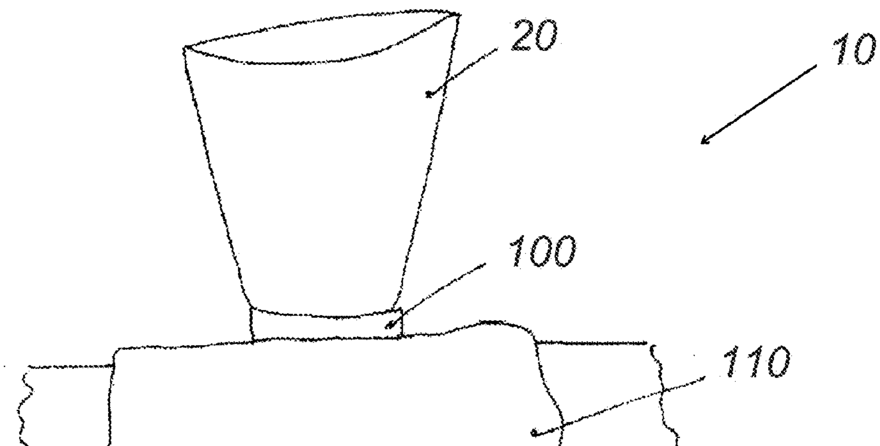


FIG. 2

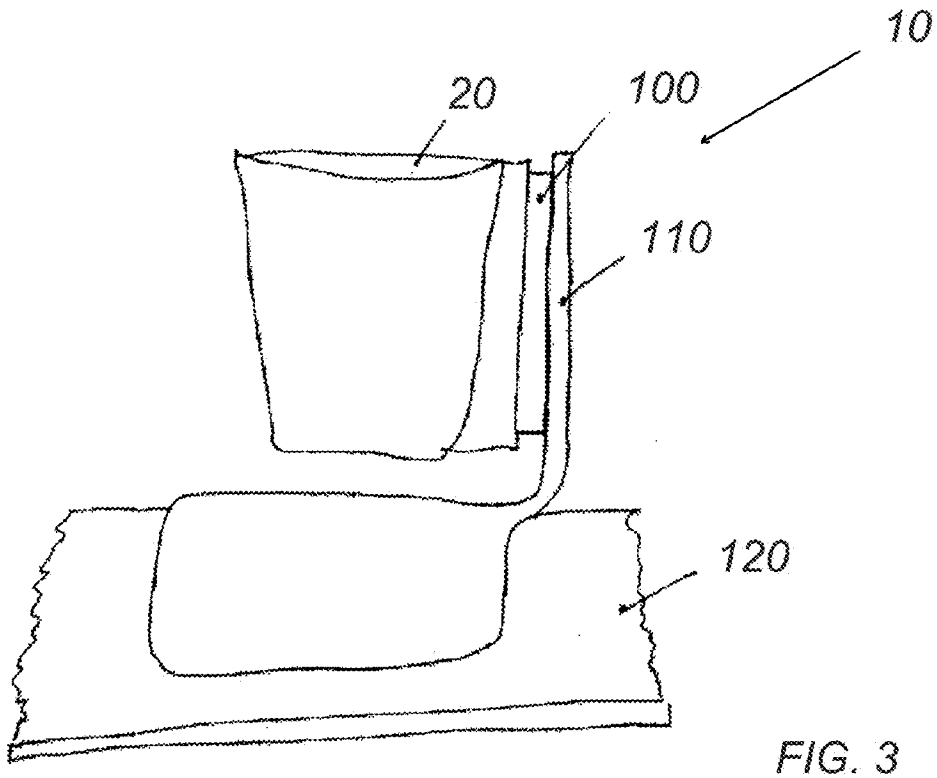


FIG. 3

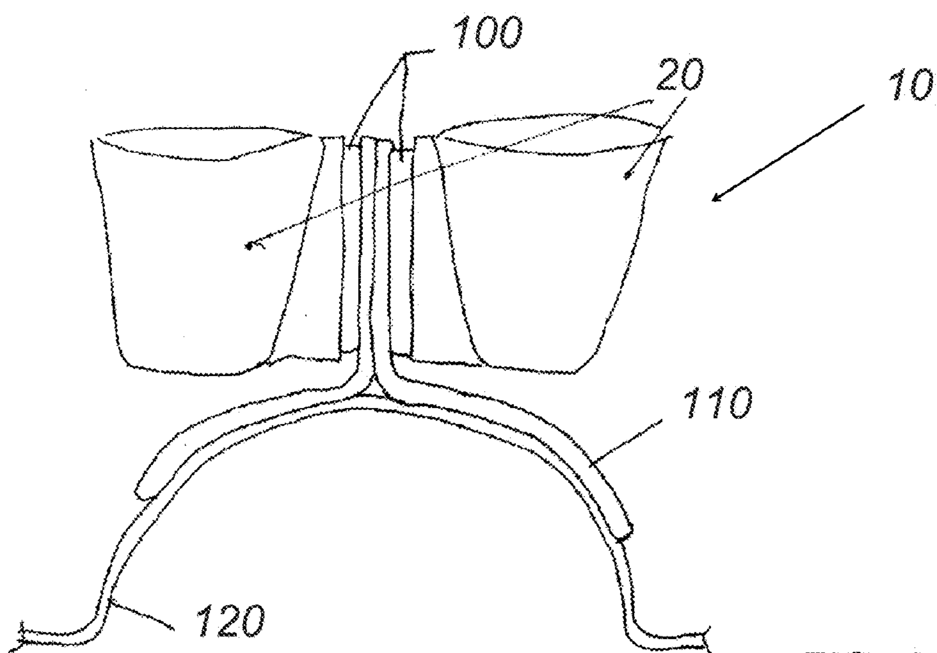


FIG. 4

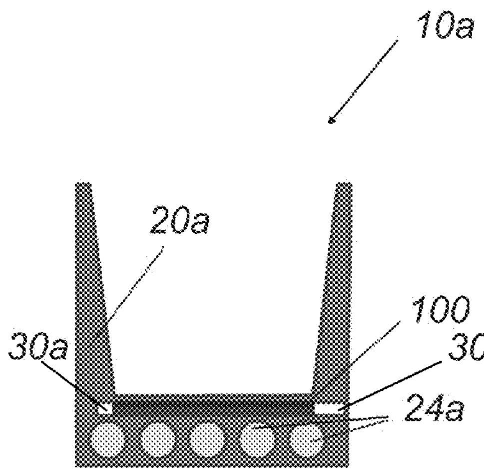


FIG. 5a

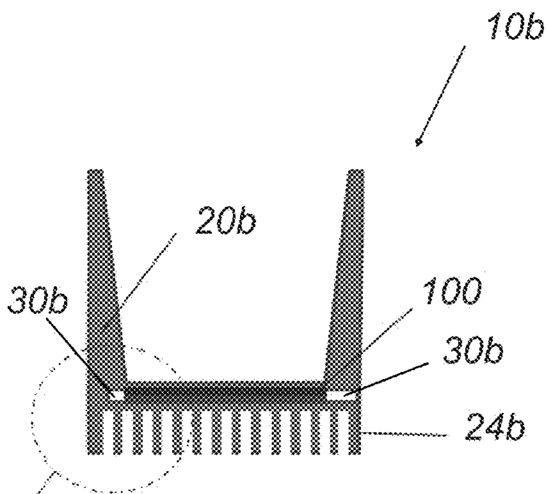


FIG. 5b

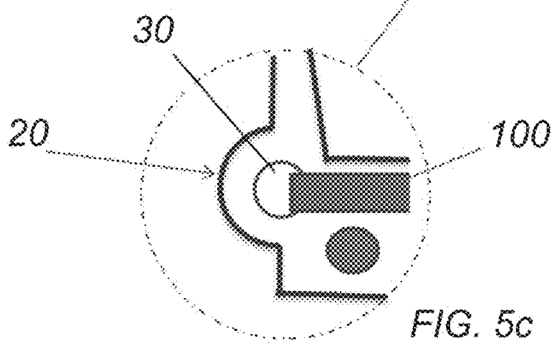


FIG. 5c

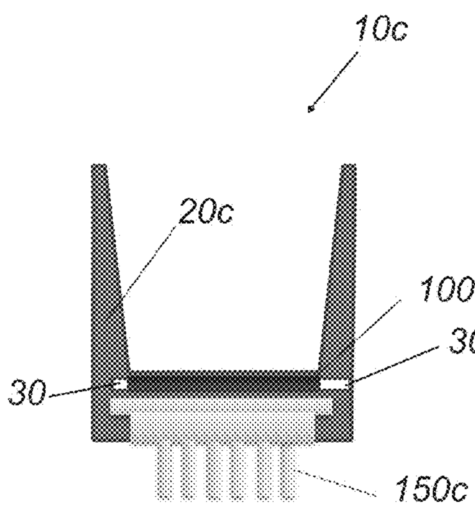


FIG. 6a

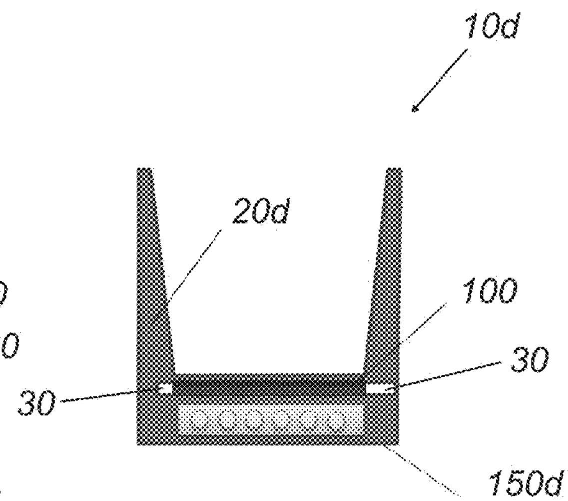


FIG. 6b

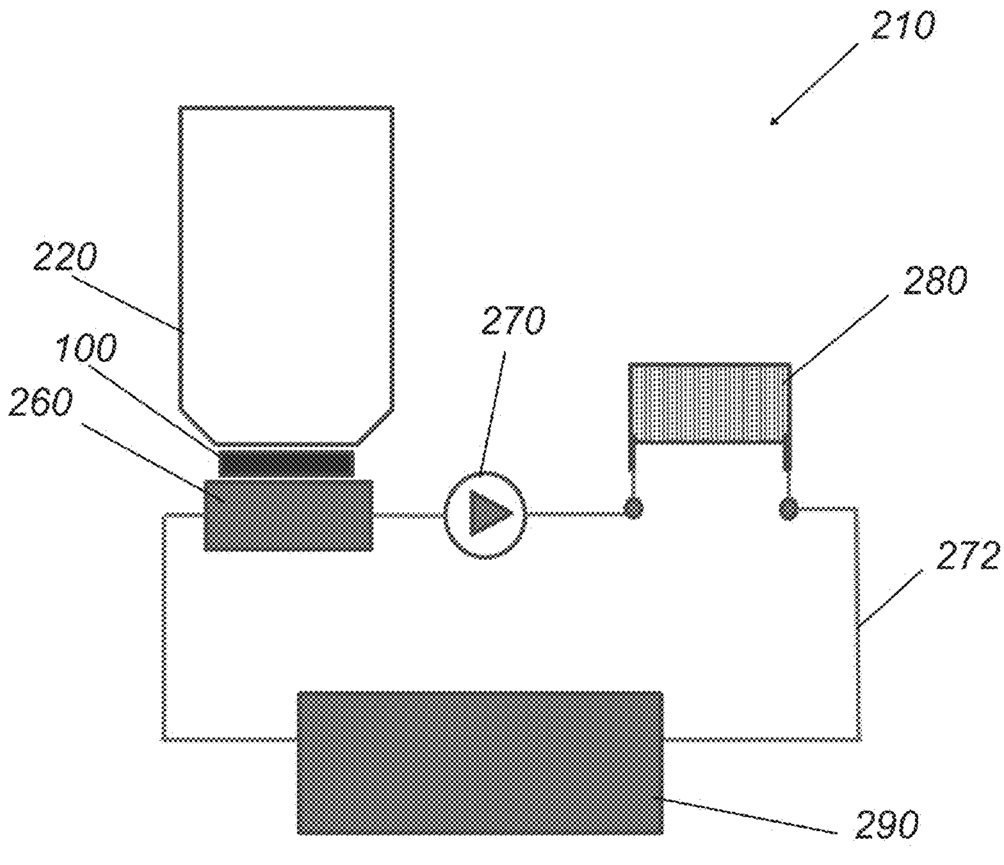


FIG. 7

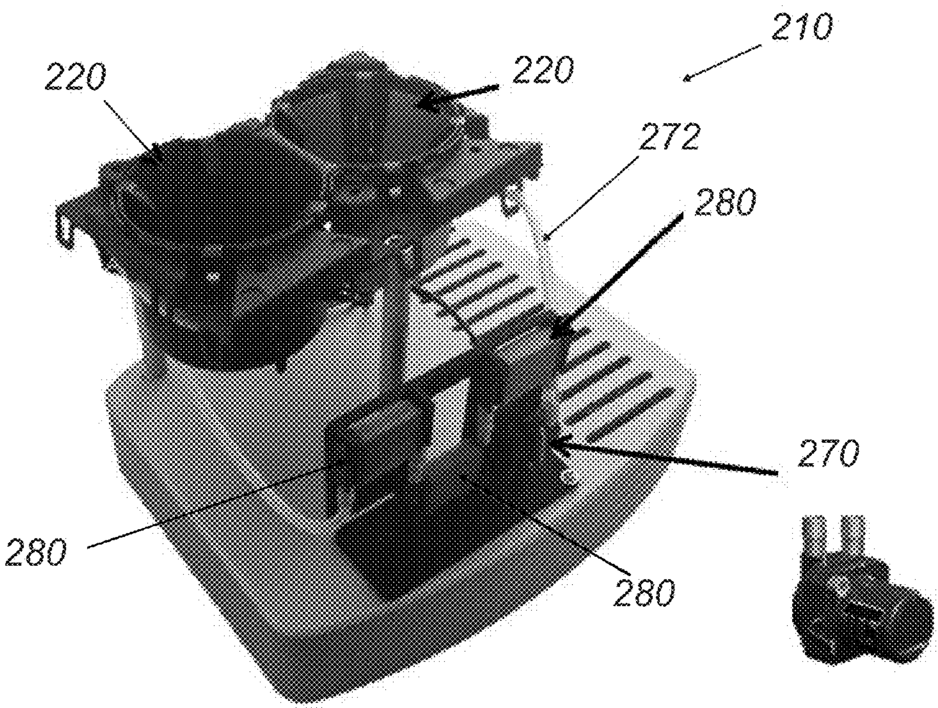


FIG. 8a

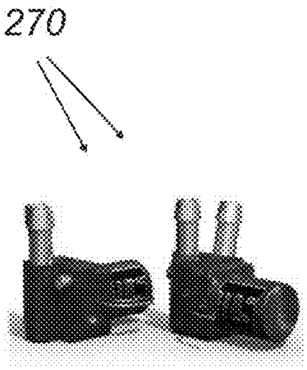


FIG. 8b

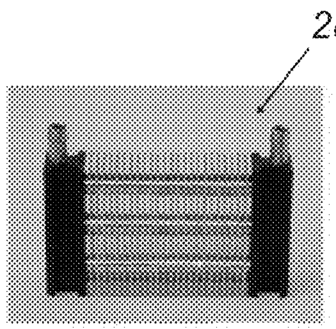


FIG. 8c

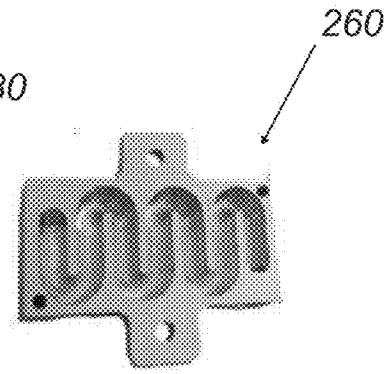


FIG. 8d

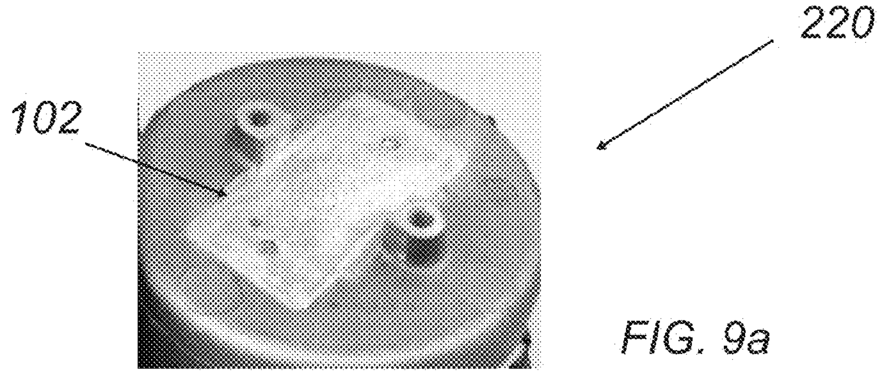


FIG. 9a

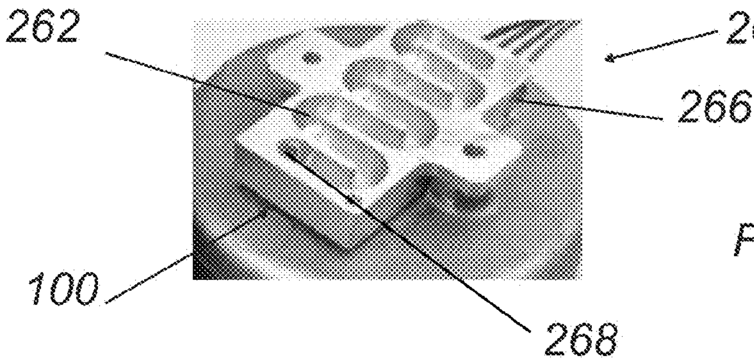


FIG. 9b

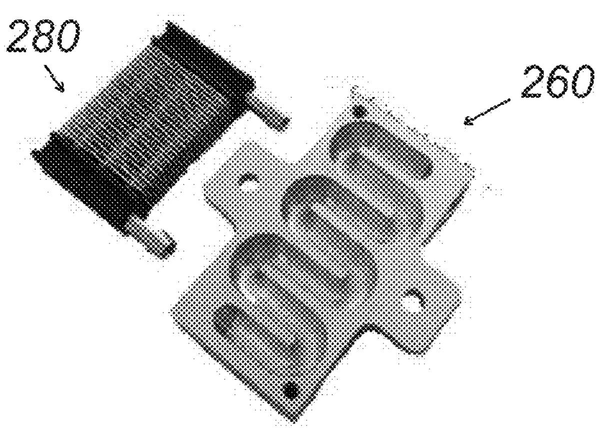


FIG. 9c

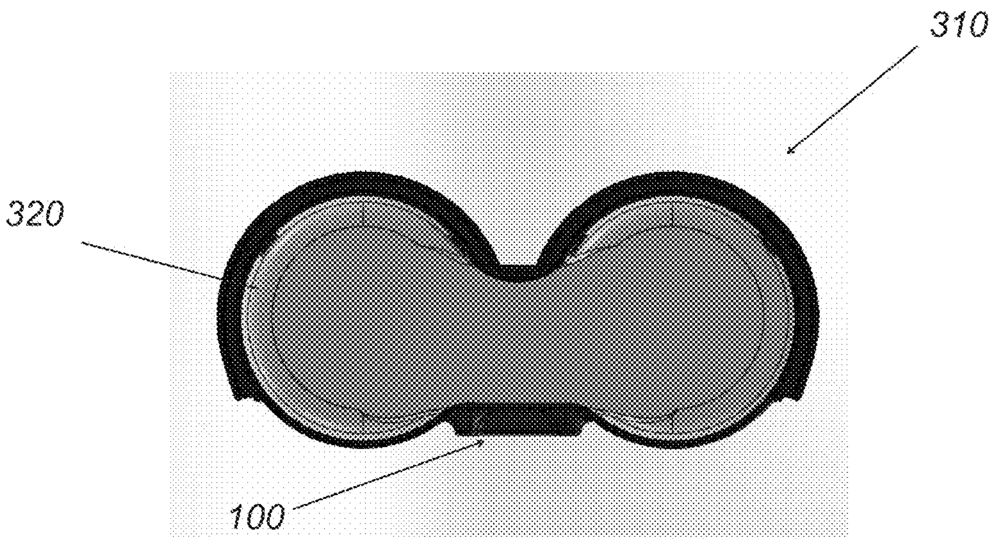


FIG. 10a

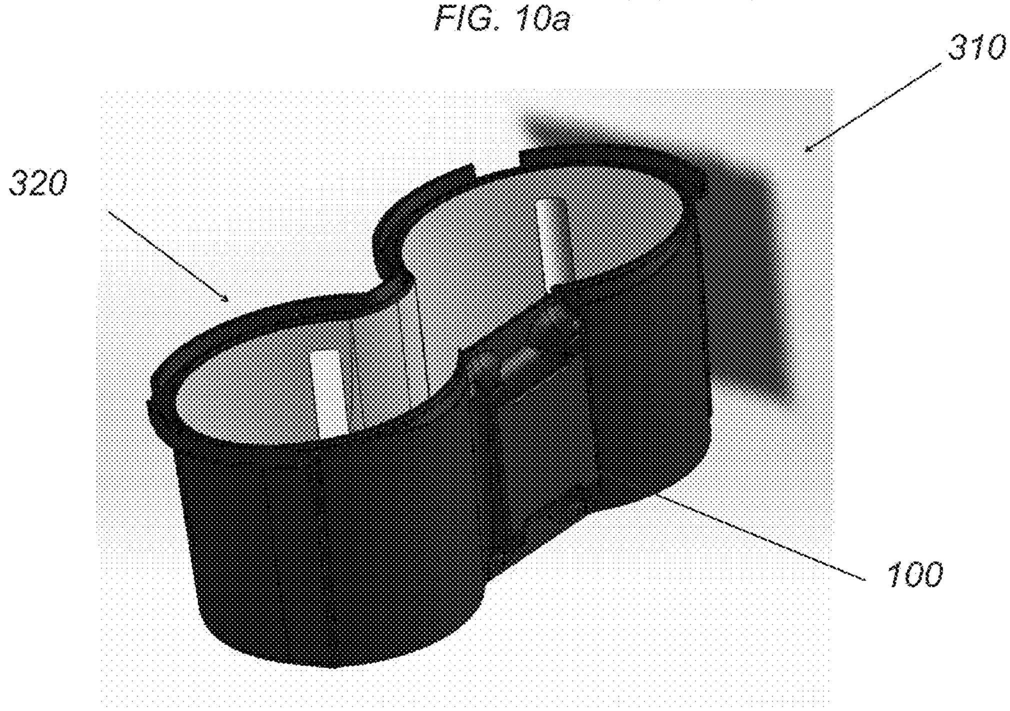


FIG. 10b

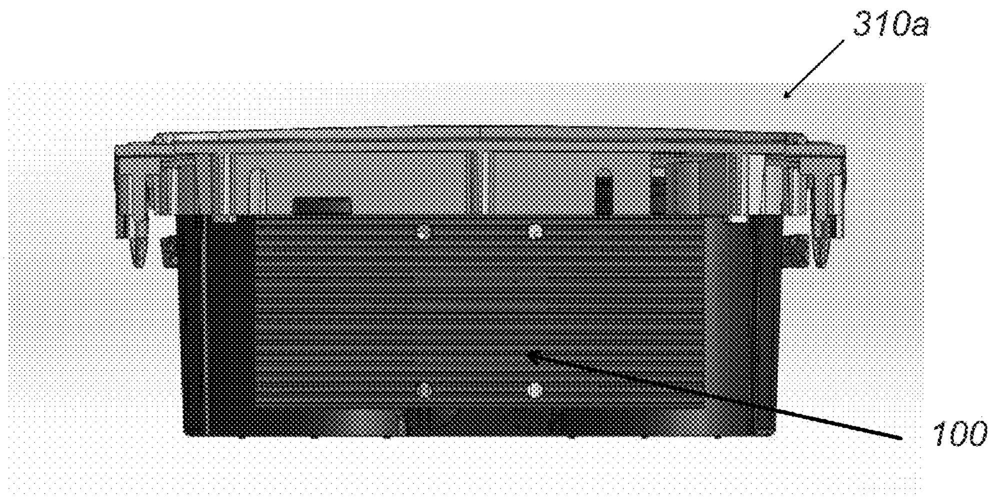


FIG. 11a

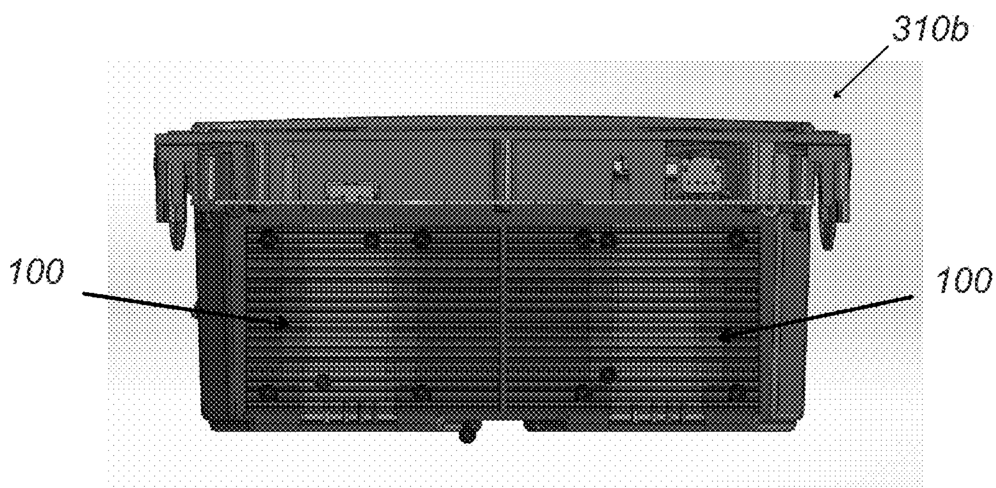


FIG. 11b

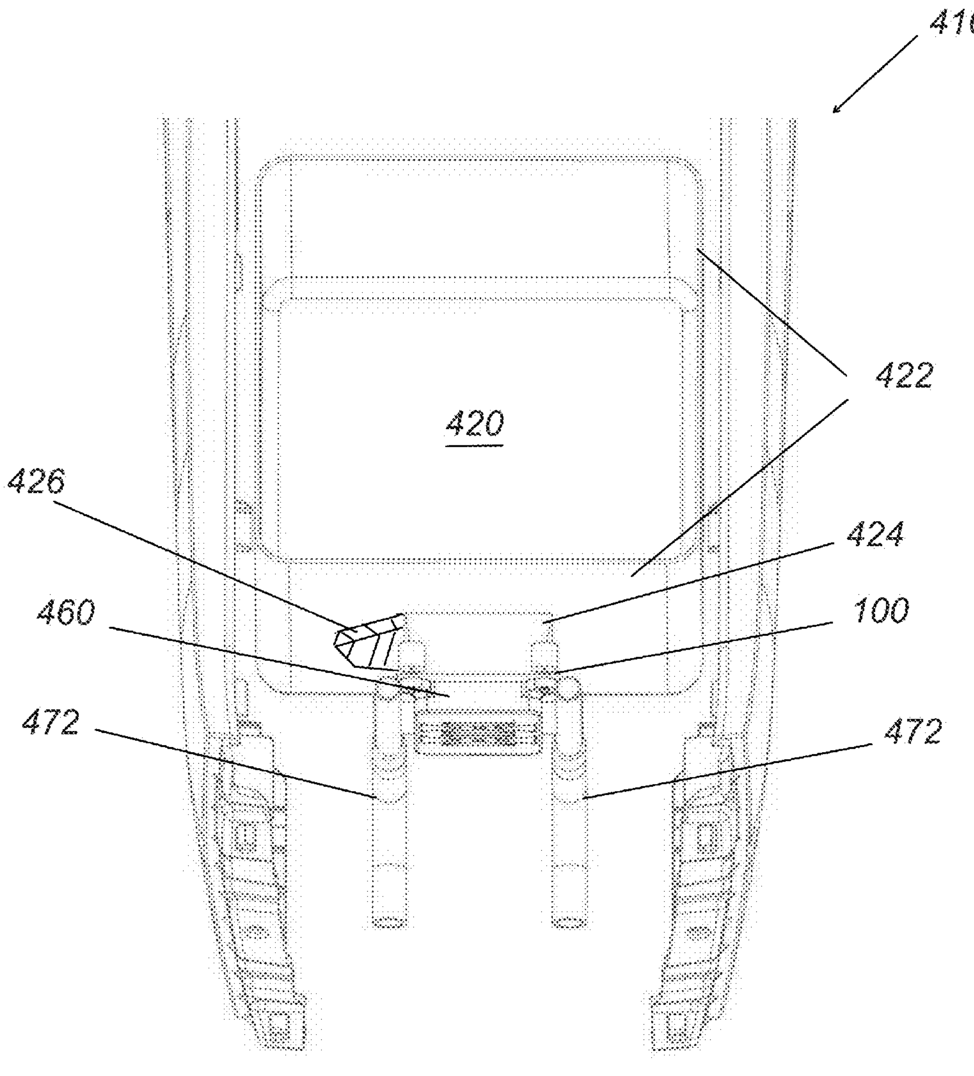


FIG. 12a

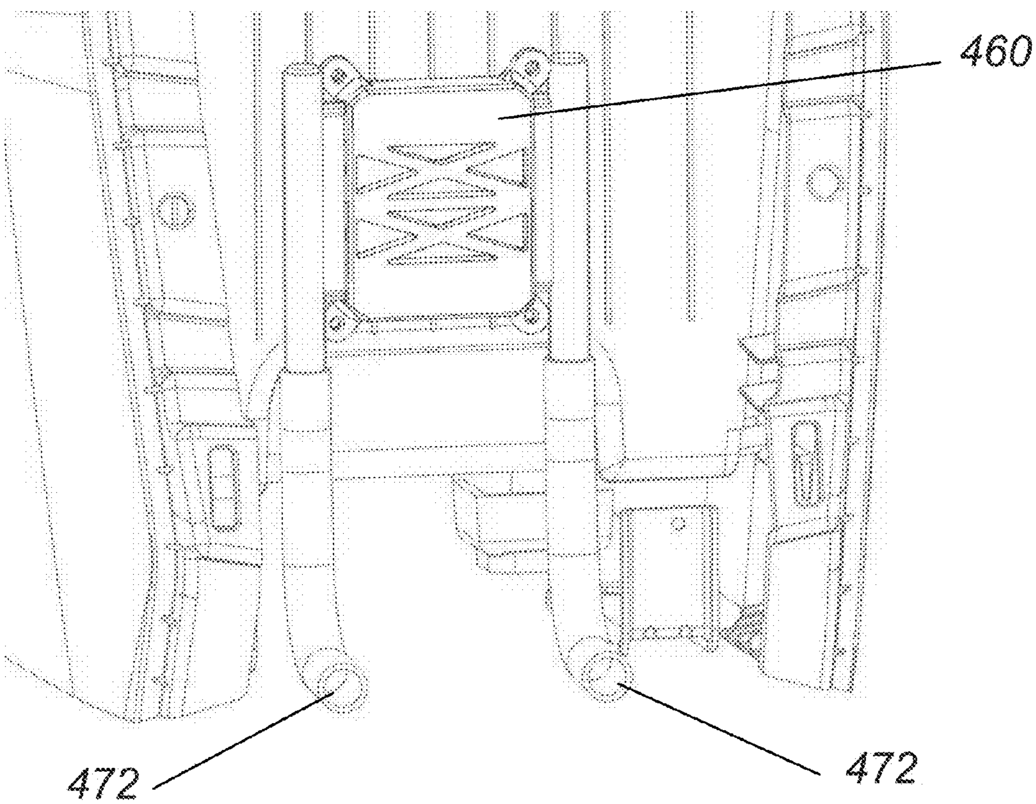


FIG. 12b

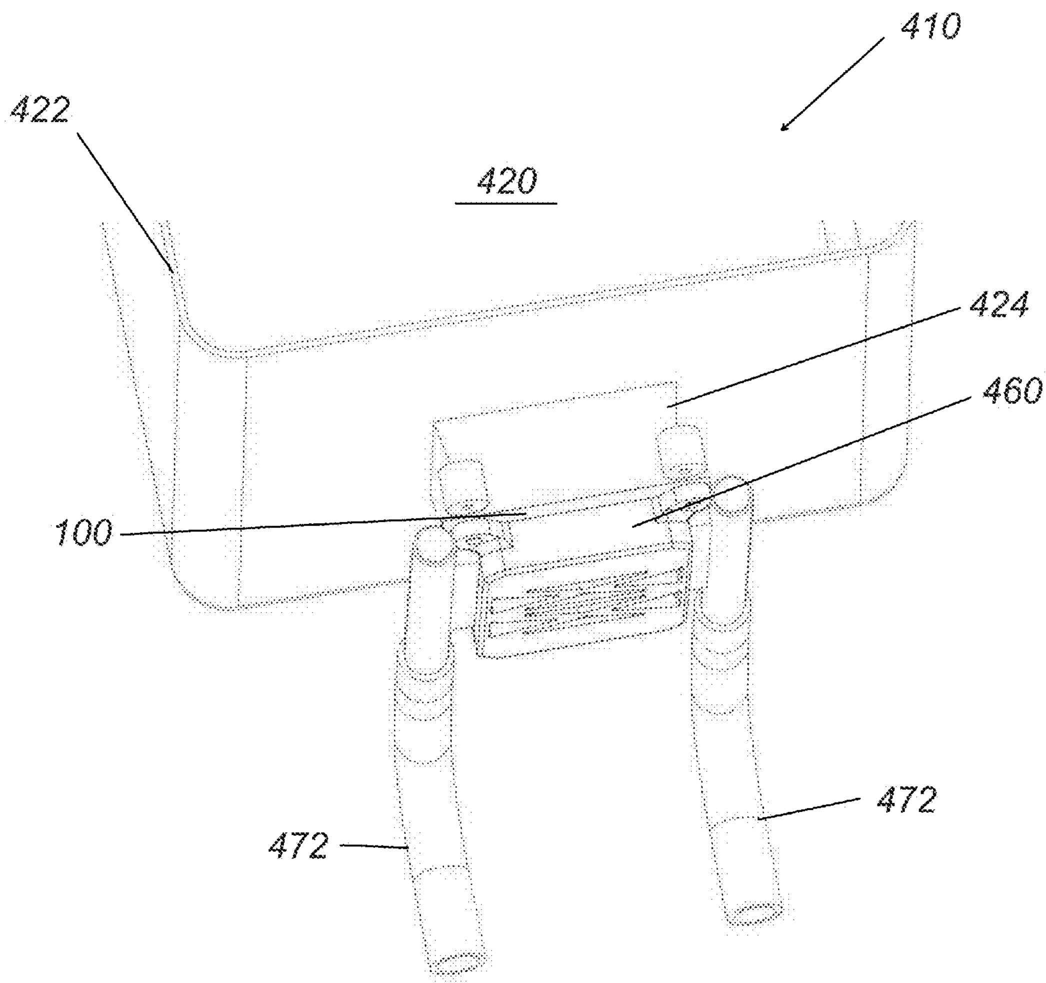


FIG. 13a

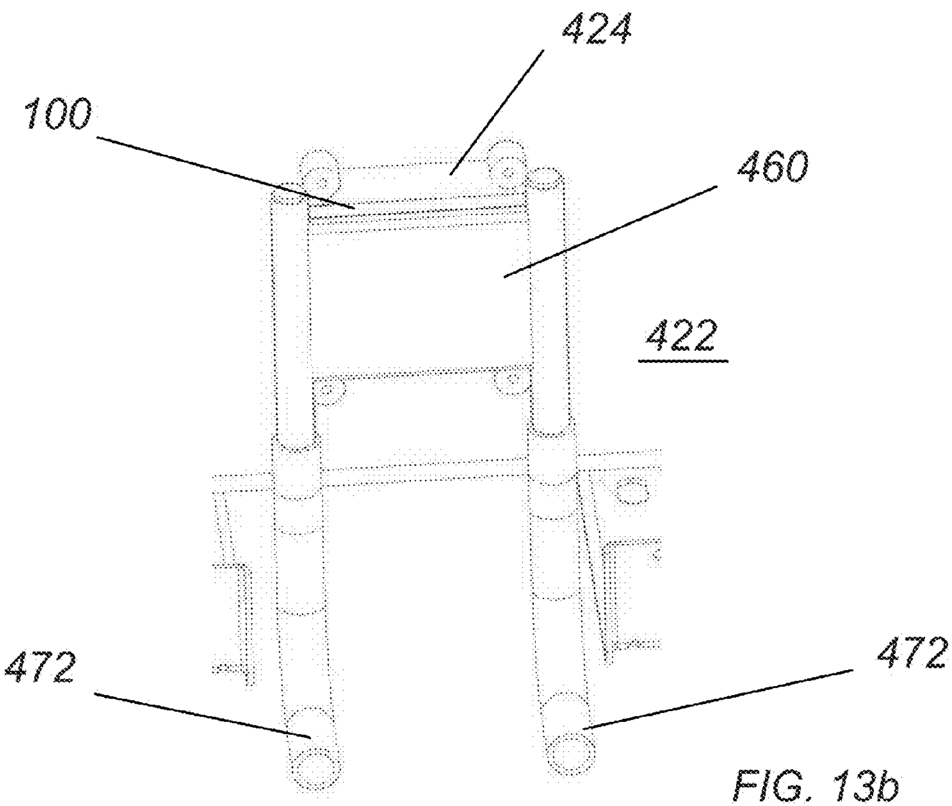


FIG. 13b

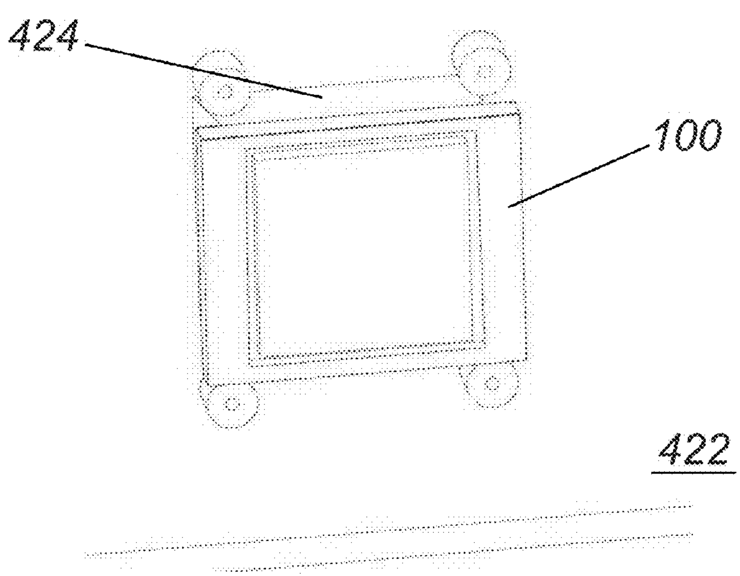


FIG. 13c

THERMALLY-CONDITIONED BEVERAGE HOLDERS AND BINS

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the priority benefit under 35 U.S.C. §119(e) of U.S. Provisional Application No. 61/798,022, filed Mar. 15, 2013, the entirety of which is hereby incorporated by reference herein.

BACKGROUND

[0002] 1. Field

[0003] This application relates generally to thermally-conditioned devices, and, more specifically, to thermally-conditioned beverage holders and bins.

[0004] 2. Description of the Related Art

[0005] Vehicles can include one or more thermally-conditioned beverage holders and/or bins. Such devices receive and store beverages (e.g., contained in cups, bottles, cans, other containers, etc.), food and the like, and selectively cool and/or heat such items.

SUMMARY

[0006] According to some embodiments, thermally-conditioned device comprises a receptacle configured to receive an item, the receptacle comprising a wall, the wall comprising an exterior surface, wherein the receptacle comprises at least one thermally conductive material. The thermally-conditioned device further comprises a thermoelectric device secured to the exterior surface of the wall of the receptacle, and a liquid-loop heat exchange system comprising a cold plate adjacent the thermoelectric device, wherein the thermoelectric device is positioned between the wall of the receptacle and the cold plate, wherein the thermoelectric device is thermally conductive with both the receptacle and the cold plate.

[0007] According to some embodiments, the device comprises a beverage holder or cupholder for receiving a beverage container. In other embodiments, the device comprises a bin. In one embodiment, the receptacle is at least partially open to the surrounding environment. In some embodiments, the receptacle is configured to define an enclosed space (e.g., comprises one or more doors and/or other closable features). According to some embodiments, the wall of the receptacle comprises at least one of a side wall and a bottom wall.

[0008] According to some embodiments, the cold plate includes an inlet and an outlet, and a liquid channel extending between the inlet and the outlet. In some embodiments, the cold plate comprises a unitary or monolithic construction. In one embodiment, the cold plate comprises at least two portions that are configured to mate with one another. In one embodiment, the cold place includes a lid or cover as part of a multi-piece construction or design.

[0009] According to some embodiments, the liquid channel comprises a serpentine or tortious shape. In some embodiments, the liquid channel comprises a non-linear shape. In one embodiment, the liquid-loop heat exchange system additionally comprises a secondary heat exchanger, a pump, a fluid conduit and/or a blower or other fluid transfer device. In one embodiment, the secondary heat exchanger is separate from the cold pack. In some embodiments, the secondary heat exchanger comprises an air-type heat exchanger.

[0010] According to some embodiments, the thermoelectric device is secured directly to the exterior surface of the wall of the receptacle. In some embodiments, the thermoelectric device is secured indirectly to the exterior surface of the wall of the receptacle, wherein at least one intermediate member is positioned between the thermoelectric device and the wall of the receptacle, the at least one intermediate member being thermally conductive. In one embodiment, the at least one intermediate member comprises a thermal grease, a thermal foil, a thermal pad and/or solder. In one embodiment, the at least one intermediate member comprises a thermally conductive spacer block or other thermally connecting member or feature.

[0011] According to some embodiments, a thermal insulation layer is positioned along at least a portion of the exterior of the wall. In one embodiment, a thermal insulation layer is positioned along at least a portion of the exterior of the wall around the spacer block, wherein the spacer block allows the thermal contact between the thermoelectric device and the wall of the receptacle despite the presence of the thermal insulation layer.

[0012] According to some embodiments, the wall comprises at least one feature for securing at least one of the thermoelectric device and the cold pack directly to the wall. In some embodiments, the at least one feature comprises at least one opening (e.g., screw or bolt opening, recess, etc.) or feature (e.g., tab, clamp, other protruding member, etc.) for receiving a fastener. In one embodiment, the cold pack is directly coupled to the wall using at least one attachment method, wherein the thermoelectric device is positioned between the wall and the cold pack when the cold pack is coupled to the wall. In some embodiments, wherein the at least one attachment method comprises at least one of a screw, a bolt, another fastener, another mechanical connection and an adhesive.

[0013] According to some embodiments, the device further comprises at least one blower configured to pass air across or near a portion of the secondary heat exchanger. In some embodiments, the at least one thermally conductive material of the receptacle comprises a metal, an alloy, a thermally conductive thermoplastic and/or any other thermally conductive material. In some embodiments, the at least one thermally conductive material comprises aluminum, copper or steel. In some embodiments, the at least one thermally conductive material comprises thermally-conductive plastic.

[0014] According to some embodiments, a thermally-conditioned beverage holder comprises a receptacle configured to receive a beverage container, the receptacle comprising sidewalls and a bottom wall, wherein the sidewalls and the bottom wall form a monolithic structure, and wherein the receptacle comprises at least one thermally conductive material (e.g., aluminum, copper, highly conductive plastic, etc.). The beverage holder additionally comprises a recess located within a portion of the sidewalls or the bottom wall of the receptacle, and a thermoelectric device secured within the recess, wherein the thermoelectric device is configured to conductively cool or heat the receptacle.

[0015] According to some embodiments, the beverage holder further comprises at least one heat exchange assembly configured to transfer heat away from the thermoelectric device. In one embodiment, the heat exchange assembly is incorporated within the monolithic structure of the receptacle. In one embodiment, the heat exchange assembly comprises an air-based heat exchange system. In some embodiments,

[0016] the heat exchange assembly comprises a plurality of fins, pins or similar heat exchangers. In some embodiments, the fins are formed from the monolithic structure of the receptacle along the bottom wall or along the sidewall of the receptacle.

[0017] According to some embodiments, the heat exchange assembly comprises a liquid-loop heat exchange system. In some embodiments, the heat exchange assembly comprises at least one liquid channel,

[0018] wherein the at least one liquid channel is configured to receive a liquid for removal of heat from the thermoelectric device during use, and wherein the at least one liquid channel comprises an opening located within a wall of the receptacle.

[0019] According to some embodiments, the at least one liquid channel is oriented in a serpentine pattern. In some embodiments, each of the recess and the at least one liquid channel is located within a bottom wall of the receptacle. In some embodiments, the at least one thermally conductive material comprises a metal, an alloy, a thermally conductive thermoplastic and/or the like. In some embodiments, the at least one thermally conductive material comprises aluminum, copper or steel. In some embodiments, the at least one thermally conductive material comprises thermally-conductive plastic.

[0020] According to some embodiments, the thermoelectric device is permitted to expand and retract within the recess in response to temperature variations. In one embodiment, the heat exchange assembly is manufactured by removed portions of the monolithic structure of the receptacle. In some embodiments, the removed portions are in the shape of fins or an internal channel.

[0021] According to some embodiments, the heat exchange assembly is a different member from the monolithic structure of the receptacle, wherein the heat exchange assembly is at least partially embedded within the receptacle. In some embodiments, the heat exchange assembly comprises a metal, and the receptacle comprises a thermally conductive plastic.

[0022] According to some embodiments, a thermally-conditioned beverage holder comprises a receptacle configured to receive a beverage container, the receptacle comprising at least one sidewall and a bottom wall, wherein the sidewalls and the bottom wall form a monolithic structure, wherein the receptacle comprises at least one thermally conductive material and thermoelectric device secured to an exterior surface of the receptacle along the sidewall or the bottom wall.

[0023] According to some embodiments, the beverage holder further comprises a liquid-loop heat exchange system, the liquid-loop heat exchange system comprises a cold plate adjacent the thermoelectric device, wherein the thermoelectric device is positioned between the receptacle and the cold plate, wherein the thermoelectric device is thermally conductive with both the receptacle and the cold plate. In some embodiments, the cold plate includes an inlet and an outlet, and a liquid channel extending between the inlet and the outlet. In one embodiment, the liquid channel comprises a serpentine shape. In one embodiment, the liquid channel comprises a non-linear shape. In some embodiments, the liquid-loop heat exchange system additionally comprises an air-type heat exchanger, a pump and a fluid conduit.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024] These and other features, aspects and advantages of the present application are described with reference to drawings of certain embodiments, which are intended to illustrate, but not to limit, the concepts disclosed herein. The attached drawings are provided for the purpose of illustrating concepts of at least some of the embodiments disclosed herein and may not be to scale.

[0025] FIG. **1** schematically illustrates a thermally-conditioned beverage holder according to one embodiment;

[0026] FIG. **2** schematically illustrates a thermally-conditioned beverage holder according to another embodiment;

[0027] FIG. **3** schematically illustrates a thermally-conditioned beverage holder according to one embodiment;

[0028] FIG. **4** schematically illustrates a thermally-conditioned beverage holder according to another embodiment;

[0029] FIG. **5***a* schematically illustrates a thermally-conditioned beverage holder comprising a liquid-loop heat exchange system according to one embodiment;

[0030] FIG. **5***b* schematically illustrates a thermally-conditioned beverage holder comprising an air-based heat exchange system according to one embodiment;

[0031] FIG. **5***c* schematically illustrates a detailed view of a portion of a beverage holder according to one embodiment;

[0032] FIGS. **6***a* and **6***b* schematically illustrate different embodiments of thermally-conditioned beverage holders;

[0033] FIG. **7** schematically illustrates one embodiment of a thermally-conditioned beverage holder comprising a liquid-loop heat exchange system;

[0034] FIG. **8***a* illustrates a perspective view of one embodiment of a thermally-conditioned beverage holder comprising a liquid-loop heat exchange system;

[0035] FIGS. **8***b* to **8***d* illustrate embodiments of various components of the liquid-loop heat exchange system used in the beverage holder of FIG. **8***a;*

[0036] FIG. **9***a* illustrates a perspective bottom view of one embodiment of a beverage holder;

[0037] FIG. **9***b* illustrates one embodiment of a cold plate of a liquid-loop heat exchange system secured to the bottom of the beverage holder of FIG. **9***a;*

[0038] FIG. **9***c* illustrates embodiments of a heat exchanger unit and a cold plate of a liquid-loop heat exchange system;

[0039] FIGS. **10***a* and **10***b* illustrate top and perspective views, respectively, of a dogbone-shaped thermally-conditioned beverage holder;

[0040] FIG. **11***a* illustrates a side view of one embodiment of a thermally-conditioned beverage holder comprising a single thermoelectric device;

[0041] FIG. **11***b* illustrates a side view of one embodiment of a thermally-conditioned beverage holder comprising two thermoelectric devices;

[0042] FIGS. **12***a* and **12***b* illustrate different views of a thermally-conditioned bin comprising a liquid-loop heat exchange system according to one embodiment; and

[0043] FIGS. **13***a* to **13***c* illustrate different views of a thermally-conditioned bin comprising a liquid-loop heat exchange system according to one embodiment.

DETAILED DESCRIPTION

[0044] FIG. **1** schematically illustrates an embodiment of a thermally-conditioned beverage holder **10** comprising two adjacent beverage receptacles **20**. As shown, the container **10** can include a cover or housing **30**. A thermoelectric device **100** is positioned below each beverage receptacle **20** to heat or cool the corresponding receptacle (and any container or other item positioned therein). In the depicted embodiment, the beverage holder **10** comprises a thermal conduction element

110 (e.g., a heat spreader) that is positioned between the thermoelectric devices **100** and the vehicle body **120**. As schematically represented by the arrows in FIG. **1**, the thermal conduction element **110** can help transfer heat away from the thermoelectric devices **100** through at least a portion of the vehicle body **120** (or other base member) without the use of a fan or other fluid transfer device. In some embodiments, the thermal conduction element **110** includes a relatively large area to help dissipate heat through vehicle body **120**. The thermal conduction element **110** can comprise one or more thermally conductive materials, including, but not limited to, metals or alloys (e.g., aluminum, steel, etc.), thermally conductive plastics and/or like.

[0045] Likewise, each of the beverage holders **10** schematically depicted in FIGS. **2** to **4** includes a thermal conduction element or heat spreader **110** to transfer heat away from the thermoelectric devices **100** to a base member **120** (e.g., a vehicle body) without the use of fluid transfer devices or liquid-loop heat exchange systems. As shown, the size, shape and/or other characteristics of the thermal conduction element **110** can vary. For example, the thermal conduction elements **110** of FIGS. **3** and **4** also serve, at least in part, as a beverage container stand or support member. Further, the thermal conduction element **110** of FIG. **4** includes a split design comprising two different portions.

[0046] The various features and concepts included in the beverage holder embodiments disclosed herein can be incorporated into thermally-conditioned bins (and vice versa). Additional details regarding thermally-conditioned beverage holders and bins are provided in U.S. application Ser. No. 11/669,117, filed Jan. 30, 2007 and issued as U.S. Pat. No. 8,104,295 on Jan. 31, 2012, the entirety of which is incorporated by reference herein and made a part of the present application. In addition, although the various beverage holder and configurations provide herein use conduction-based thermal conditioning, one or more of the disclosed concepts may be incorporated into convection-based holders and bins.

[0047] The beverage holder **10***a* schematically illustrated in FIG. **5***a* includes a beverage receptacle **20***a* that comprises one or more thermally-conductive materials. In any of the embodiments disclosed herein, thermally conductive materials can include, but are not limited to, metals or alloys (e.g., aluminum, copper, steel, etc.), thermally conductive plastics and/or like. As shown, the receptacle **20***a* comprises a recess or other opening **30***a* within its bottom wall. The recess **30***a* can be shaped, sized and otherwise configured to receive a thermoelectric device **100**. In other embodiments, such a recess **30***a* for receiving a thermoelectric device **100** can be positioned along a side wall or any other portion of the receptacle. For any of the embodiments disclosed herein that comprise a recess **30**, **30***a*, the thermoelectric device **100** can be secured within such recess **30**, **30***a* using one or more attachment methods, devices or substances, such as, for example, thermal grease, thermal pad or foil, solder, other adhesives, fasteners, press-fit or friction-fit connections and/or the like. In some embodiments, the relatively thin region of monolithic material of the receptacle **20***a* surrounding the recess **30**, **30***a* can provide additional advantages and benefits to the beverage holder **10***a*, including, by way of example, forming an elastic (or a partially elastic) connection between an upper portion of the beverage receptacle **20***a* (e.g., an area above the recess **30***a*) and a lower portion of receptacle **20***a* (e.g., an area below the recess that forms and/or includes heat exchange members). This design feature can alleviate or otherwise reduce problems caused by any inaccuracies, tolerance issues and/or other inconsistencies associated with manufacturing of such devices. In addition, the elastic connection can allow for thermal expansion of a thermoelectric device **100** positioned within the recess **30***a*, can facilitate insertion and maintenance of the thermoelectric device **100** within the recess **30***a*, can create a defined pressing force on the thermoelectric device (see, e.g., the pressed or pinched ends of the thermoelectric device illustrated in FIG. **5***c*) and/or the like.

[0048] With continued reference to FIG. **5***a*, a liquid-loop heat exchange system can be positioned, completely or partially, within the receptacle **20***a*. For example, one or more liquid channels **24***a* can be routed through and formed within the body of the receptacle **20***a*. Thus, in some embodiments, a unitary or monolithic receptacle structure is thermally coupled to both the main side and waste side of a thermoelectric device **100**. As shown, the channels **24***a* can be positioned adjacent (e.g., immediately below) the recess **30***a* to facilitate heat transfer between the thermoelectric device **100** and liquid circulating through the channels **24***a*.

[0049] The beverage holder **10***b* illustrated in FIG. **5***b* also comprises a heat exchange assembly **24***b* formed by the unitary structure of the receptacle. However, the heat exchange assembly **24***b* of FIG. **5***b* is air-based, not liquid based. The heat exchange assembly **24***b* can comprise a plurality of fins or other members along which heat may dissipate, either with or without the use of a blower or other fluid transfer device moving air through the assembly **24***b*. Thus, in some embodiments, a heat exchange assembly **24***a*, **24***b* can be incorporated into a cup receptacle **20***a*, **20***b* comprising a monolithic or unitary structure.

[0050] Accordingly, in some embodiments, a monolithic receptacle **20***a*, **20***b* is both the main side heat exchanger and the waste side exchanger. Traditional thermoelectric systems have thermal gaps or other thermal discontinuities to ensure that the targeted level of thermal conditioning occurring along the main side of a thermoelectric device is not offset or otherwise negatively impacted by opposite type of thermal conditioning occurring along the waste side. However, in the beverage holder embodiments disclosed in FIGS. **5***a* and **5***b*, the recess or other opening **30***a*, **30***b* in which the thermoelectric device **100** is located helps to create a partial thermal conductive barrier between the areas above and below the recess **30***a*, **30***b*. For example, in some embodiments, the sidewalls of the beverage receptacles **20***a*, **20***b* form a monolithic connection with the bottom wall of the receptacles only along a relatively thin portion of the receptacle **20***a*, **20***b* that surrounds the recess **30***a*, **30***b*.

[0051] FIGS. **6***a* and **6***b* schematically illustrate embodiments of a thermally-conductive unitary receptacle **20***c*, **20***d* of a beverage holder **10***c*, **10***d* that incorporates, at least partially within the receptacle's structure, a separate heat transfer assembly **150***c*, **150***d*. For example, in FIG. **6***a*, the heat transfer assembly **150***c* comprises an air-based heat exchange system that extends through the bottom wall of the cup receptacle **20***c*. Similarly, in FIG. **6***b*, the receptacle **20***d* houses or otherwise incorporates within its structure a liquid-loop heat exchange system **150***d*. In the depicted embodiment, the heat exchange system **150***d* is completely encapsulated or surrounded by the receptacle **20***d*. In other arrangements, however, the heat exchange system **150***d* is only partially surrounded by the receptacle **20***d*.

[0052] One embodiment of a thermally-conditioned beverage holder **210** comprising a liquid-loop heat exchange system is schematically illustrated in FIG. **7**. As shown, one or more thermoelectric devices **100** can be placed in thermal contact with a receptacle **220**. For example, as discussed with reference to other arrangements disclosed herein, a thermoelectric device **100** can be placed along a wall (e.g., bottom wall, side wall, etc.) of a thermally-conductive cup receptacle **220**.

[0053] With continued reference to FIG. **7**, a cold plate **260** can be placed in thermal contact with the waste side of the thermoelectric device **100**. Accordingly, heat generated by the thermoelectric device **100** (e.g., when the thermoelectric device **100** cools the cup receptacle) can be transferred to a liquid flowing through the cold plate **260**. As discussed in greater detail herein, the cold plate **260** can be thermally conductive and can comprise one or more channels or passages. Thus, heat can be transferred from the waste side of the thermoelectric device **100** to the water and/or other liquid passing through the channels of the cold plate **260**. Heated liquid exiting the cold plate **260** can be transferred within pipes, tubing or other conduit through one or more secondary heat exchangers **280** (e.g., air heat exchangers, other heat radiators **280**, etc.), liquid reservoirs and/or the like, using one or more fluid pumps **270**. In some embodiments, such circulation of liquid through the liquid-loop heat exchange system removes heat from the liquid exiting the cold plate **260**. In any of the embodiments disclosed herein, one or more fluid transfer devices (e.g., blowers, fans, etc.) can be provided to selectively provide air and/or other fluid to, through and/or near a secondary heat exchanger **280**. In some embodiments, the use of such fluid transfer devices can help improve the desired or required heat transfer characteristics along such secondary heat exchangers **280**.

[0054] FIGS. **8***a* to **8***d* illustrate an embodiment of a thermally-conditioned cup holder **210** comprising a liquid-loop heat exchange system similar to the one discussed above with reference to FIG. **7**. As shown, the cup holder **210** can include two cup receptacles **220** and one or more of the following: thermoelectric devices **100** (not shown) in thermal contact with at least a portion of the receptacles **220**, fluid pumps **270**, air heat exchangers **280**, liquid reservoirs, fluid conduit **272** and/or the like for circulating liquid through the system.

[0055] With reference to FIGS. **8***d* and **9***b*, the cold plate **260** can include one or more internal channels **262**, which in some embodiments comprise a tortious, serpentine or sinusoidal shape. Although not illustrated herein, a covering or plate can be placed adjacent the channels **262** to enclose the channels **262** and permit liquid to be transferred through the cold plate **260** (form an inlet **268** to an outlet **266**). In other arrangements, the shape, size, layout, orientation and/or other characteristics of the channels **262** can be different than depicted in FIGS. **8***d* and **9***b*.

[0056] FIG. **9***a* illustrates a bottom surface of a thermally conductive beverage receptacle **220** configured to receive a thermoelectric device **100**. The thermoelectric device **100** can be secured to an exterior surface of the beverage receptacle **200** (e.g., along the shaded area **102** in FIG. **9***a*), either directly or indirectly. For example, the thermoelectric device **100** can be positioned on the receptacle **220** using thermal grease, thermal foil or pad, other adhesives and/or the like.

[0057] As shown in FIG. **9***b*, a cold plate **266** positioned adjacent the waste side of the thermoelectric device **100** is secured to the bottom wall of the beverage receptacle **220** (e.g., using one or more screws, bolts or other fasteners). As noted above, a cover or other sealing member (not shown) can be placed against the cold plate **260** to enclose the channels **262**. Thus, in some embodiments, a cold plate **260** and a thermoelectric device **100** can be directly positioned along one or more surfaces of a monolithic or unitary receptacle **220**.

[0058] FIGS. **10***a* and **10***b* illustrate one embodiment of a beverage holder **310** having two receptacles **320**. In the depicted arrangement, the beverage holder **310** comprises a dogbone shape. As with other embodiments disclosed herein, the beverage receptacles **320** of the holder **310** can include a monolithic or unitary structure comprising one or more thermally conductive materials. In the depicted arrangement, a single thermoelectric device **100** is positioned along a portion of the sidewall (e.g., in the area located generally between the two receptacles **320**). Accordingly, a single thermoelectric device **100** can be used to conductively cool or heat two beverage receptacles **320**. A side view of a similarly configured beverage holder **310***a* with a single thermoelectric device **100** is illustrated in FIG. **11***a*. In other embodiments, such as the beverage holder **310***b* of FIG. **11***b*, each beverage receptacle comprises a dedicated thermoelectric device **100**.

[0059] A liquid-loop heat exchange system can be similarly incorporated into a thermally-conditioned bin or other enclosed container. One embodiment of such a bin **410** is illustrated in FIGS. **12***a* to **12***b* and **13***a* to **13***c*. As shown, the bin **410** can include an interior space **420** configured to receive food, beverages and/or any other items. The interior space **420** is defined by a sidewall **422** having a monolithic or unitary design. As with the beverage holder configurations disclosed herein, the sidewall **422** can be placed in thermal contact with one or more thermoelectric devices **100**. As shown, a connecting member or spacer block **424** can be positioned between the bin's sidewall **422** and the thermoelectric device **100** to place the thermoelectric device **100** in thermal contact with the bin **410**. This can be particularly helpful where it is impossible, difficult or impractical to secure the thermoelectric device **100** directly on the sidewall **422** of the bin **410**. For example, such thermally-conductive connecting members or spacer blocks **424** can be used in embodiments of a bin that comprise one or more layers of thermally insulating material (see, e.g., insulation layer **426** in FIG. **12***a*; only a small portion of the insulation layer **426** is illustrated for clarity; however, in some embodiments, the insulation layer **426** can extend along all or a substantial exterior surface of the wall of the receptacle or bin, as desired or required). The use of such connecting members or spacer blocks **424** can be incorporated into any thermally-conditioned beverage holder and bin embodiments disclosed herein (e.g., to permit a thermoelectric device to come in thermal contact with a wall of such a holder or bin in instances whether there are one or more other layers or components around the wall of the holder or bin).

[0060] As illustrated in FIGS. **12***a* and **12***b*, the thermally-conditioned bin **410** can comprise a liquid-loop heat exchange system for removing heat from the thermoelectric device **100** during use. In some embodiments, the liquid-loop exchange system includes a cold plate **460** that is placed in thermal contact with the thermoelectric device **100**. As discussed herein with reference to other arrangements, the cold plate **460** can include one or more internal channels through which liquid can flow. In some embodiments, as illustrated in FIGS. **8***d* and **9***b*, the channels **262** of the cold plate **460** can include a serpentine or other tortious configuration.

[0061] With continued reference to FIGS. **12***a* and **12***b*, liquid can be transferred to and from the cold plate **460** pipes, tubing and/or other fluid conduits **472**. Similar to the beverage holder configurations disclosed herein, liquid (e.g., water) can be circulated through the interior of the cold plate **460** to remove heat from the adjacent thermoelectric device **100**. The heated liquid can then be circulated through one or more secondary heat exchangers or heat radiators (e.g., air-based heat exchanger, liquid-based heat exchanger, any other type of heat exchanger, etc.), reservoirs and/or other liquid-loop heat exchange system components. A similarly configured embodiment of a thermally-conditioned bin **410** comprising a liquid-loop heat exchange system is illustrated in FIGS. **13***a*-**13***c*. In any of the embodiments disclosed herein, one or more fluid transfer devices (e.g., blowers, fans, etc.) can be provided to selectively provide air and/or other fluid to, through and/or near a secondary heat exchanger. In some embodiments, the use of such fluid transfer devices can help improve the desired or required heat transfer characteristics along such second heat exchangers.

[0062] To assist in the description of the disclosed embodiments, words such as upward, upper, bottom, downward, lower, rear, front, vertical, horizontal, upstream, downstream have been used above to describe different embodiments and/or the accompanying figures. It will be appreciated, however, that the different embodiments, whether illustrated or not, can be located and oriented in a variety of desired positions.

[0063] Although several embodiments and examples are disclosed herein, the present application extends beyond the specifically disclosed embodiments to other alternative embodiments and/or uses of the inventions and modifications and equivalents thereof. It is also contemplated that various combinations or subcombinations of the specific features and aspects of the embodiments may be made and still fall within the scope of the inventions. Accordingly, it should be understood that various features and aspects of the disclosed embodiments can be combine with or substituted for one another in order to form varying modes of the disclosed inventions. Thus, it is intended that the scope of the present inventions herein disclosed should not be limited by the particular disclosed embodiments described above, but should be determined only by a fair reading of the claims that follow.

[0064] While the inventions are susceptible to various modifications, and alternative forms, specific examples thereof have been shown in the drawings and are herein described in detail. It should be understood, however, that the inventions are not to be limited to the particular forms or methods disclosed, but, to the contrary, the inventions are to cover all modifications, equivalents, and alternatives falling within the spirit and scope of the various embodiments described and the appended claims. Any methods disclosed herein need not be performed in the order recited. The ranges disclosed herein also encompass any and all overlap, subranges, and combinations thereof. Language such as "up to," "at least," "greater than," "less than," "between," and the like includes the number recited. Numbers preceded by a term such as "about" or "approximately" include the recited numbers. For example, "about 10 mm" includes "10 mm." Terms or phrases preceded by a term such as "substantially" include the recited term or phrase. For example, "substantially parallel" includes "parallel."

What is claimed is:

1. A thermally-conditioned cup holder device comprising:

a cup holder member for receiving a beverage container,

at least one thermoelectric device having a main side in thermal communication with the cup holder and a waste side;

a liquid loop heat exchange system in thermal communication with the waste side of the at least one thermoelectric device, the liquid loop heat exchange system being configured, when in use, to remove heat away from the waste side.

2. The cup holder device of claim **1**, wherein the cup holder member comprises a thermally conductive plastic.

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