US 20110042549A1

(19) **United States**

(12) **Patent Application Publication**

Schiro

(10) **Pub. No.: US 2011/0042549 A1**

(43) **Pub. Date: Feb. 24, 2011**

(54) **METALLIC CYLINDER CORE ICE MOLD BEVERAGE COOLER**

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(21) Appl. No.: **12/853,226**

(22) Filed: **Aug. 9, 2010**

Related U.S. Application Data

(60) Provisional application No. 61/235,510, filed on Aug. 20, 2009.

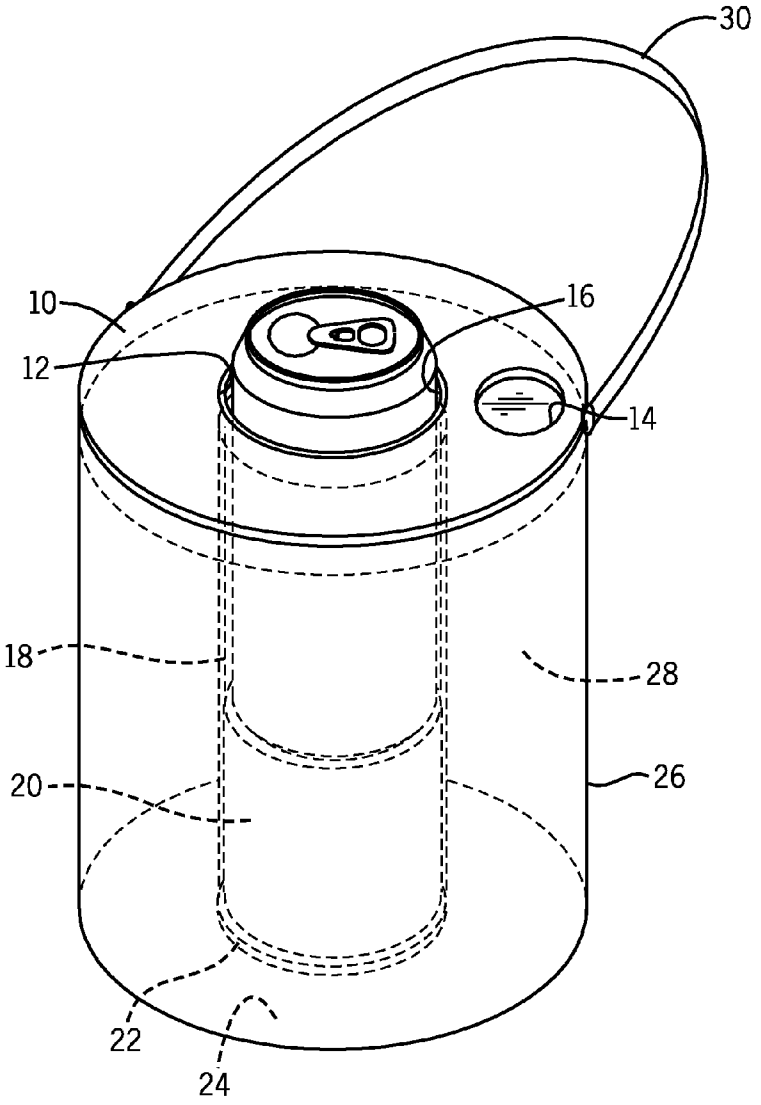
Publication Classification

(51) **Int. Cl.**
F25C 1/22 (2006.01)
F25C 1/00 (2006.01)

(52) **U.S. Cl.** **249/134**; 249/117

(57) **ABSTRACT**

A cooler is disclosed that utilizes a single beverage compartment (i.e. a metallic cylinder core) that is attached to the container holding the refrigerant (i.e. solid ice). The beverage compartment is completely encircled by a wall of ice that is at least one inch thick yet physically separated from it. The design provides easy access to the beverage, close contact between the beverage and the ice, efficient transfer of heat between the beverage and the ice via the metallic core and no contact between melting ice and the beverage.



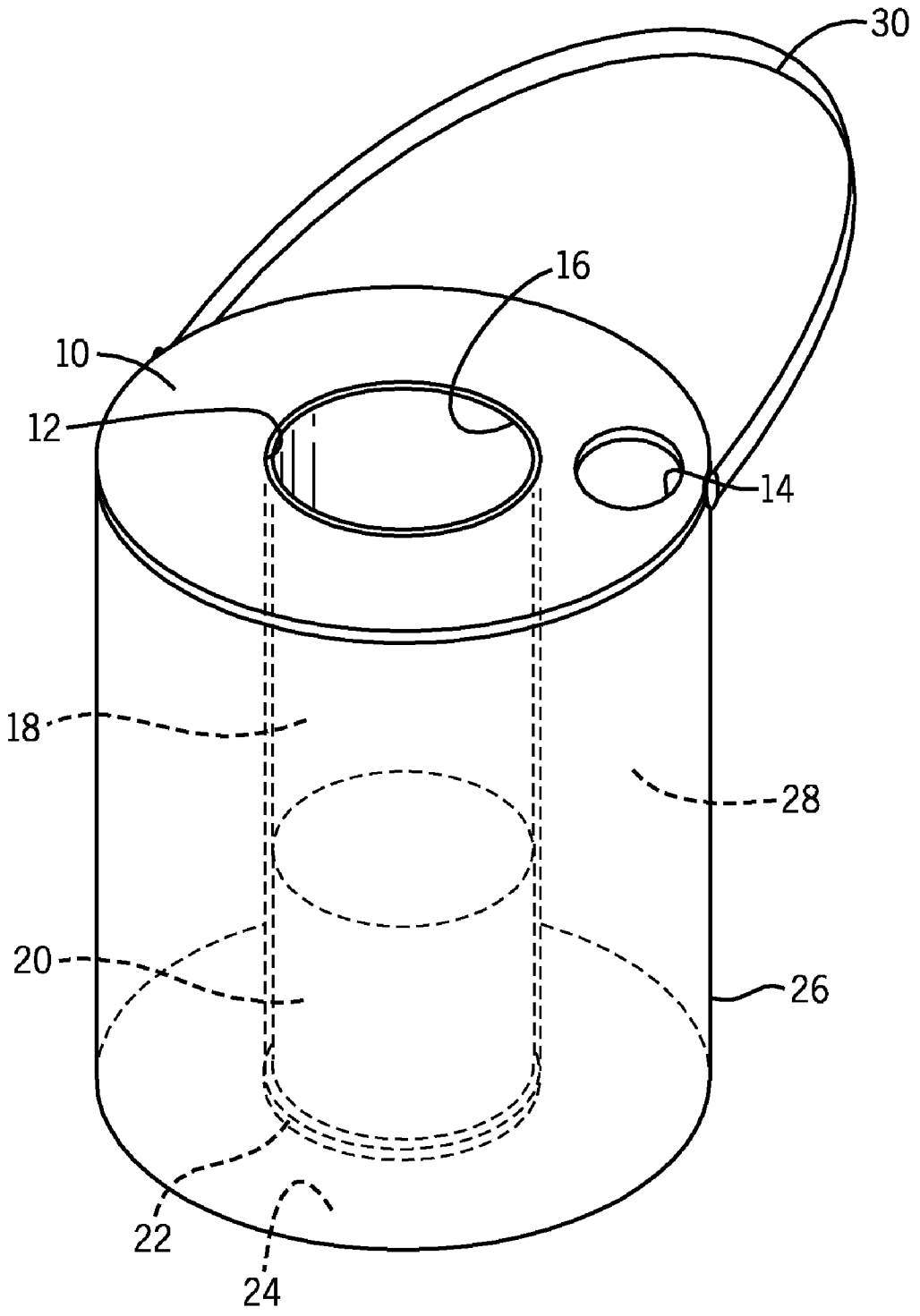


FIG. 1

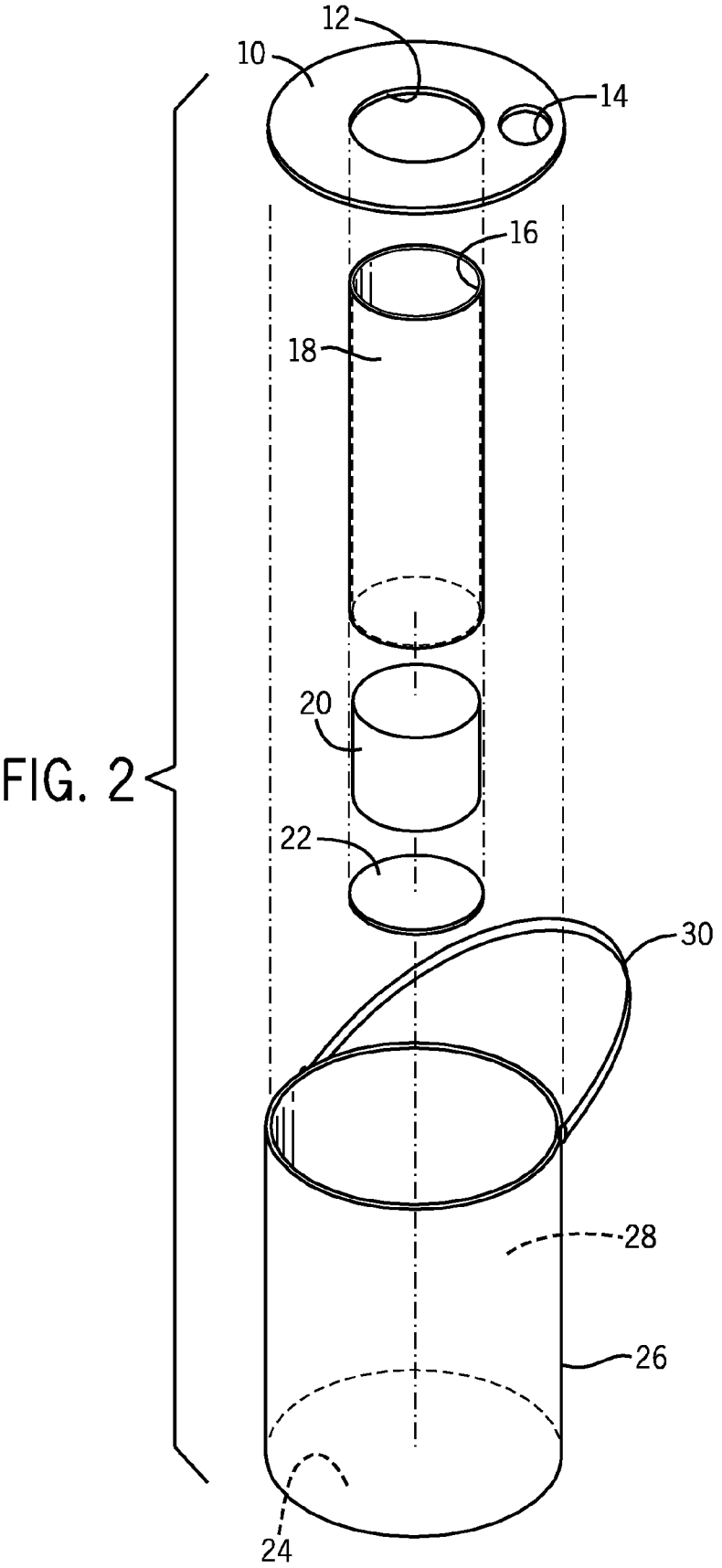


FIG. 2

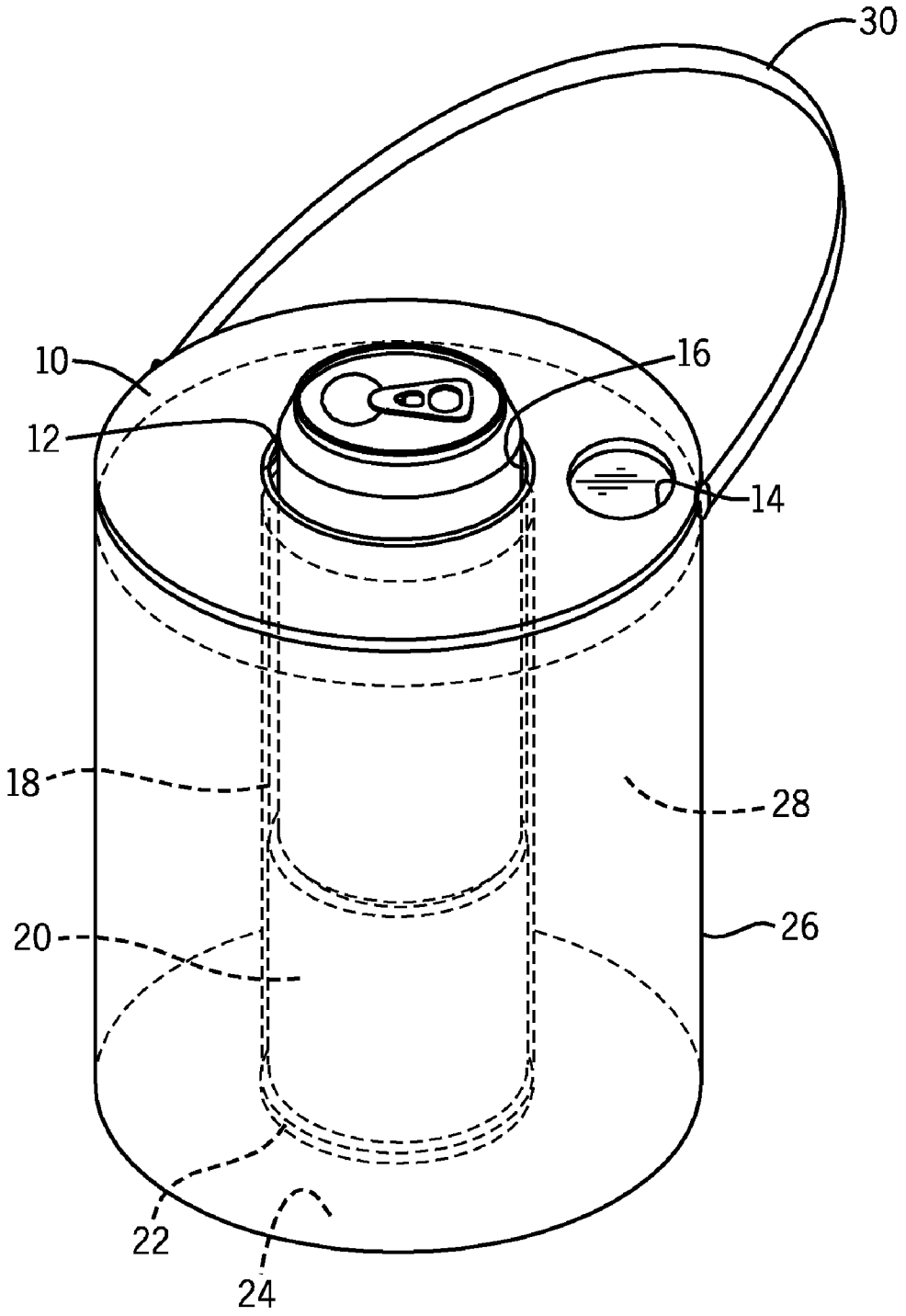


FIG. 3

METALLIC CYLINDER CORE ICE MOLD BEVERAGE COOLER

CROSS REFERENCE TO RELATED APPLICATIONS

[0001] This application claims benefit of U.S. Provisional Application Ser. No. 61/235,510, filed Aug. 20, 2009.

FIELD OF THE INVENTION

[0002] The present invention pertains to the temperature regulation of packaged fluids, such as canned or bottled beer and soft drinks.

BACKGROUND OF THE INVENTION

[0003] Using ice to cool bottled or canned drinks has become essential for picnics, sporting events and other outdoor activities during warm weather.

[0004] The many potential uses for coolers have inspired much variation in their design. There are large coolers and small, light coolers and heavy. The majority of coolers however (those actually available in the marketplace), all share one thing in common: they contain a cavity that holds both the material to be cooled (i.e. the canned or bottled drinks) and the refrigerant (i.e. the ice). In all of these coolers the beverage containers come into direct contact with pieces of ice (i.e. ice cubes, not a solid block of ice) and also with melting ice water.

[0005] There is another type of cooler that is not actually in the marketplace but which is found in the prior art (i.e. the patent database). These share a common feature: they are designed to keep the beverage separate from the ice (and therefore also from melting ice water). They are also all made from molded plastic. This means that there is always a layer of plastic between the beverage and the ice. This characteristic limits the cooling efficiency of this type of beverage cooler since plastic is more often used as an insulator rather than as a conductor of heat.

[0006] There is another variation on the container of ice cubes as a cooler: the common ice bucket. An ice bucket is suitable for cooling a single beverage container, either a bottle or a can. But an ice bucket also has the same limitations described above. As the ice melts, it loses cooling efficiency and the beverage container gets very wet. But even before the ice starts to melt, an ice bucket has a problem with the initial removal of the beverage container being cooled. Once removed, it may be difficult to return the beverage to the ice bucket. This occurs because pieces of ice (i.e. ice cubes) tend to fall back into the hole left by the removed beverage container. This problem decreases as the cooling efficiency also decreases (i.e. as melt water increases) because it becomes easier to reinsert the beverage into the ice since the melt water acts as a lubricant. But this introduces another problem. The melt water increases while the beverage is gradually consumed and the contained beverage becomes lighter. Thus the beverage container itself becomes gradually more buoyant in the melt water and therefore less inclined to stay under the ice.

[0007] Clearly, the most efficient method of heat transfer between a single beverage container and a quantity of ice (the most common and readily available refrigerant) would be in the form of an ice block with a hole. This would be more efficient than a bucket of ice since ice cubes in a bucket melt uniformly. With ice cubes, ice and water are always evenly distributed throughout the bucket and around the beverage container. But a block of ice with a hole does not melt uniformly (assuming that the hole is filled with an already cold beverage container). In this case, the ice will first melt from the outside of the ice block to the inside; similar to how a solid block of ice melts. Therefore, a block of ice with a cold beverage container filled hole will keep a beverage colder longer than a bucket of ice since solid ice would stay in contact with the beverage container longer.

[0008] Accordingly, a need exists for a cooler that does not possess the limitations stated above. In particular, a need exists for a cooler that provides the benefits of an ice block with a hole for a beverage container. This need would be better filled by a beverage cooler that provides consistent cooling over a greatly extended period of time. Thus this need would be better filled by a beverage cooler that encapsulates a beverage with a wall of solid ice more than one inch thick. Since metal is superior to plastic as a heat conductor, this need would be better filled by a cooler that uses metal rather than plastic to separate the beverage from the ice. This need would also be better filled by a beverage cooler that can actually be manufactured without the need for custom molded plastic; a cooler composed only of off-the-shelf parts and parts that can be custom made inexpensively in small quantities.

DESCRIPTION OF THE PRIOR ART

[0009] The ice mold beverage coolers described in U.S. Pat. Nos. 6,622,516 and 6,751,982 depict one invention. It is an ice mold in the shape of a tube that is inserted into the neck of a drink bottle. As such, it has no usefulness for beverage cans or beverage bottles that are not in the shape of a standard athlete's drink bottle. It also has a very limited cooling capacity since the actual amount of ice inserted into the drink bottle would be minimal.

[0010] The beverage cooler described in U.S. Pat. No. 5,269,368 is made from thin extruded plastic separating a thin layer of refrigerant from the beverage. This thin refrigerant layer means that the duration of cooling would be minimal. Also, the unit must be pre-filled with refrigerant at the factory and will therefore be more expense to deliver to the end user than a unit that can be filled by the end user at home.

[0011] The beverage cooler described in U.S. Pat. No. 6,446,461 is made from rigid molded plastic. It is slightly larger than a six-pack of standard 12 oz beverage cans. The interface between beverage and refrigerant is a layer of rigid plastic, which means that heat transfer between beverage, plastic, and refrigerant would be slow and inefficient. Also, the rigid molded plastic will crack if the cooler is mistakenly overfilled with water and frozen. Also, the thickness of refrigerant layer around each beverage container would be quite small. This means that the duration of cooling would be minimal. This cooler also either utilizes a specially made cap to cover its fill hole or it uses no fill hole at all. In the former case, the fill hole cap adds unnecessary cost to the unit since once filled; gravity is sufficient to keep the water in (or the water will be frozen and therefore immovable). In the latter case, the unit must be pre-filled at the factory and therefore would require considerable expense to deliver to the end user. Finally, this unit as described is of a large enough size that it would not fit in many small home freezers.

[0012] U.S. Pat. Nos. 4,882,914 & 4,815,287 offer "snug-fit" coolers that also use minimal refrigerant around the beverage and are composed of poorly conductive plastic or rubber. They also require the cooler to be picked-up and handled

along with the beverage container thereby adding size and heft to the beverage container.

[0013] There are several other patents describing similar beverage coolers, yet most are also molded from plastic. Alternatively, many ice buckets are molded from metal. None of these beverage coolers benefit from having an insulating polymer to hold the ice while also having a conductive metallic core to hold the beverage separate from the ice. Also, these inventions did not benefit from recent advances in adhesive technology that now make it easy to attach metal or plastic parts to freezer grade HDPE (high-density polyethylene) plastic pails. These beverage coolers also did not benefit from recent manufacturing improvements, but instead utilize initially very expensive molding or extrusion techniques. They did not benefit from a simple construction method using off-the-shelf plastic pails, inexpensively cut and machined off-the-shelf aluminum tubing, inexpensively wire cut expanded polystyrene insulating platforms and inexpensively laser cut acrylic disks.

[0014] No patented beverage cooler could come close to a finished product without first incurring great financial risk. It is clear that none of these inventions were made into finished and ready-to-ship product that was actually manufactured, assembled and fully tested prior to the publication of their patent applications. This is likely why most of them do not exist in the market today.

OBJECT AND SUMMARY OF THE INVENTION

[0015] Therefore, an object of the present invention is to provide a cooler that effectively maintains a desired temperature for a single beverage by use of an efficiently heat conductive metallic cylinder core between the beverage and the refrigerant.

[0016] Another object of the invention is to provide a cooler that serves essentially as an ice mold for the creation of a solid block of ice with a hole (e.g. a cylindrical torus) for the placement of a cold beverage container.

[0017] Another object of the invention is to provide a cooler that, like a solid block of ice, serves to provide a consistent and enduring cooling capacity for an extended period of time (more than 5 hours).

[0018] Another object of the invention is to provide a way for the top of the ice mold to automatically release from the container without breaking the top or the container. This will happen should the hollow interior be mistakenly overfilled with water thereby allowing ice to expand over the top of the container.

[0019] A further object of the invention is to keep the beverage container elevated while the cylindrical torus shaped ice block slowly melts and rises around it thereby keeping the beverage in close proximity to solid ice longer.

[0020] In one embodiment, the cooler comprises a plastic pail with a metallic cylinder capped at one end and attached to the bottom of the pail. Attached to the top of the metallic cylinder (through tension only) and coincident with the top of the pail is a clear acrylic disk. Taken together, a hollow cylindrical torus is formed. The top acrylic disk also contains a small opening. The small opening provides fluid communication with the interior of the hollow cylindrical torus. In other words, the opening (i.e. the fill hole) allows the hollow cylindrical torus cavity to be filled with water before being frozen. The center cavity of the cylindrical torus (i.e. "the center hole" which is enclosed by the metallic cylinder core) contains the beverage to be cooled. The center hole will be of a size and shape to receive a standard drink can or bottle.

BRIEF DESCRIPTION OF THE DRAWINGS

[0021] FIG. **1** is a perspective view of one embodiment of the cooler according to the invention.

[0022] FIG. **2** is an exploded view of the cooler of FIG. **1** showing its vertical construction.

DRAWINGS

List of Reference Numerals

[0023] **10** Top acrylic disk. This serves as the top of the ice mold.

[0024] **12** Center hole in the top disk (**10**). This is where the opening of the cylinder core (**16**) attaches.

[0025] **14** Fill hole in the top disk (**10**). This is how water is added to the ice mold (**28**) for freezing.

[0026] **16** Top opening of the metallic cylinder core. This is where the beverage to be cooled is inserted.

[0027] **18** Metallic cylinder core. After ice is formed, a beverage is inserted atop the EPS platform (**20**).

[0028] **20** Expanded polystyrene (EPS) insulating platform. This is inserted into the cylinder core (**18**).

[0029] **22** Bottom acrylic disk. This is used to cap and attach the cylinder (**18**) to the pail bottom (**24**).

[0030] **24** Bottom of the pail (**26**). This is where the cylinder (**18**) is attached via the bottom disk (**22**).

[0031] **26** Insulating molded plastic container (i.e. "the pail"). This forms the outside of the ice mold.

[0032] **28** Hollow interior cavity between the pail (**26**) and the metallic cylinder core (**18**). Ice is formed here.

[0033] **30** Handle for carrying the pail (**26**).

DETAILED DESCRIPTION

[0034] The invention provides a cooler for maintaining beverages at a desired temperature. In particular and referring now to FIGS. **1** and **2**, the invention provides a cooler for chilling packaged beverages, for example, beer or soft drink cans or bottles.

[0035] The embodiment of the invention shown in FIG. **1** comprises a top acrylic disk **10**. This see-through top allows for easy viewing of the water level contained in a hollow interior cavity **28** formed between a metallic cylinder core **18** and a containing plastic pail **26**. Water is added to the hollow interior **28** via a fill hole **14** in the top disk **10**. When frozen, the water forms a cylindrical torus of ice in the hollow interior **28** around the metallic cylinder core **18**. A beverage container can be inserted into an opening **16** in the cylinder **18** and through a center hole **12** in the top disk **10**. The pail can be transported with or without a contained beverage by use of a handle **30**.

[0036] FIG. **2** shows an exploded view of the vertical construction of the embodiment shown in FIG. **1**. In this embodiment the pail is composed of a high-density polyethylene (HDPE) plastic. The bottom of this pail **24** requires a special epoxy adhesive (DP-8005) supplied by 3M Corporation to attach the bottom acrylic disk **22**. To the bottom disk **22**, the expanded polystyrene (EPS) platform insert **20** is attached using a common polyurethane adhesive available from many suppliers. The EPS platform insert **20** is also attached to the interior of the metallic cylinder core **18** (aluminum in this embodiment) also using polyurethane adhesive. The polyure-

thane applied to the EPS platform insert **20** also serves to leak-proof the bottom of the cylinder **18**. The opening of the cylinder **16** is milled to allow for the attachment of the top acrylic disk **10** via its center hole **12**. When the top acrylic disk **10** is attached to the top of the aluminum cylinder **16**, it is also inserted into the top of the pail **26**. The top acrylic disk **10** is held in place by tension between the pail **26** and the top of the aluminum cylinder core **16**.

[0037] The embodiment detailed in FIGS. **1** and **2** shows a single metallic cylinder core for the insertion of a single beverage. It will be understood that the invention also includes embodiments of larger ice mold containers that produce ice block shapes other than a cylindrical torus. These may include several metallic cylinder cores for the cooling of several beverages.

[0038] The polymer employed in the practice of the invention's outer container (i.e. "the pail") may be any polymer utilized in the production of coolers or molded articles. Polymers such as high-density polyethylene (HDPE), and freezer grade polypropylene, and composites thereof are representative candidates. The outer container may alternatively have a metallic composition similar to a metal ice bucket.

[0039] The metal employed in the practice of the invention's cylinder core may be any metal suitable in the manufacture of tubing or pipes.

[0040] It will be understood that the phrase "standard drink can" or "standard drink bottle" is used in an exemplary rather than a limiting sense, and that the cooler can be formed to accommodate cans or bottles of different sizes as may be desirable or necessary. The cooler can also accommodate drink glasses or cups filled with any beverage like beer, soda, milk, juice, or water.

Operation

[0041] FIG. **1** shows a fully assembled metallic cylinder core ice mold beverage cooler. The cooler's hollow cavity **28** is first filled with water through the fill hole **14**. The cooler is then placed in a freezer long enough to allow water to freeze around the metallic cylinder core **18**. The water freezes into a solid block of ice in the shape of a cylindrical torus (i.e. a round block of ice with a hole). The pail **26** serves to contain the water/ice. The pail's handle **30** allows the cooler to be easily carried. The top acrylic disk **10** serves to insulate the top of the ice while also allowing it to be clearly viewed from above. Since the top acrylic disk **10** is tightly attached yet not permanently affixed to the metallic cylinder core **18**, it will pop off should the ice expand beyond the top of the pail (due to over-filling). The metallic cylinder core **18** serves as the receptacle for a standard size beverage can or bottle which also separates the beverage from the melting ice. Since it is composed of metal, the cylinder core **18** also serves to maximize the rate of heat transfer from the beverage to the ice. The EPS platform **20** serves to insulate the beverage from the bottom of the pail **26**. The EPS platform **20** also serves to elevate the beverage relative to the block of ice around it. This way, as the ice block gradually melts and rises within the melt water, the beverage still stays completely surrounded by ice rather than water. The bottom acrylic disk **22** serves not only to keep water out of the cylinder **18** by capping its bottom opening, but it also serves as the attachment point to the bottom of the pail **26**. This is necessary since the special epoxy adhesive needed to attach the metallic cylinder core **18** to the bottom of the pail **24** would otherwise dissolve the EPS platform **20**.

Alternative Embodiments

[0042] The embodiment detailed above is preferred since it entails the least cost to startup the manufacturing process. But other embodiments are possible as well. One such embodiment has already been mentioned. It would be comprised of a larger container with two or more metallic cylinder cores attached. It would be the equivalent of a larger block of ice with several holes rather than just one. Another embodiment would be comprised of a molded container with an integral platform that extends up from the bottom. The platform would attach to the bottom of the metallic cylinder core via a molded snap ring in the extension. This way the special epoxy adhesive used to attach the cylinder to the bottom of the container would no longer be needed. The EPS platform would also be eliminated since ice would form under the cylinder core thereby eliminating the need for insulation under the beverage. In another embodiment the container could be completely molded into the cylindrical torus shape to attach directly to the metallic cylinder core at both ends thereby eliminating the need for the top disk also. In this embodiment the metallic cylinder core would also be molded or milled with an integrated bottom so that the acrylic bottom disk would also no longer be needed.

Ramifications

[0043] Accordingly, the reader will see that the metallic cylinder core ice mold beverage cooler described herein offers several advantages:

- **[0044]** By use of a metallic interface between beverage and ice, it maximizes the rate of heat transfer between the beverage and the ice while still keeping the beverage dry.
- **[0045]** By use of a detachable top, it minimizes the likelihood of breakage due to accidental over-filling.
- **[0046]** By use of an elevated insulating platform for the beverage to sit on, heat transfer through the bottom of the pail is reduced and solid ice stays in contact with the beverage even as the ice block melts and rises.
- **[0047]** By use of simple off-the-shelf parts and custom parts that are very inexpensive even in small quantities, it offers the greatest likelihood of actually being brought to market.

CONCLUSION

[0048] The invention has been described in detail, with reference to certain preferred embodiments, in order to enable the reader to practice the invention without undue experimentation. However, a person having ordinary skill in the art will readily recognize that many of the components and parameters may be varied or modified to a certain extent without departing from the scope and spirit of the invention. Furthermore, titles, headings, or the like are provided to enhance the reader's comprehension of this document, and should not be read as limiting the scope of the present invention. Accordingly, only the following claims and reasonable extensions and equivalents define the intellectual property rights to the invention.

That which is claimed is:

1. A mold for making ice comprising:

a container open at the top,

at least one cylinder, each cylinder capped at the bottom and composed of metal and oriented vertically,

a top cover for the container having one hole for each cylinder and an additional hole for filling the container with water, the hole for each cylinder sized to hold each cylinder in tension with the top cover.

2. The mold of claim **1**, wherein the top cover for the container is removably attached to the container such that the top cover will detach from the container if freezing water inside the container expands beyond the volume of the container.

3. The mold of claim **1**, wherein each cylinder further comprises a platform composed of an insulating material inserted into the cylinder.

4. The mold of claim **3**, wherein the insulating material is expanded polystyrene.

5. The mold of claim **3**, wherein the sides of the container form a right angle with the bottom of the container and the horizontal cross section of the container is uniform, whereby melting ice inside the container will float inside the container and maintain contact with each cylinder inside the container.

6. The mold of claim **1**, wherein the distance between each cylinder is at least one inch and the distance between each cylinder and the container is at least one inch.

7. The mold of claim **1**, wherein at least one cylinder has an inner diameter greater than or equal to the outer diameter of a standard drink can.

8. The mold of claim **1**, wherein at least one cylinder has an inner diameter greater than or equal to the outer diameter of a standard drink bottle.

9. The mold of claim **1**, wherein the container is composed of an insulating material.

10. The mold of claim **9**, wherein the insulating material is selected from the group consisting of high-density polyethylene, freezer grade polypropylene, and a composite of high-density polyethylene and freezer grade polypropylene.

11. The mold of claim **1**, wherein the container is composed of metal.

12. The mold of claim **1**, wherein the top cover is composed of acrylic.

13. The mold of claim **1**, wherein at least one cylinder is composed of aluminum.

14. A mold for making ice comprising:

a container open at the top,

at least one cylinder, each cylinder capped at the bottom and composed of metal and oriented vertically,

means for joining each cylinder to the container,

a top cover for the container having one hole for each cylinder and an additional hole for filling the container with water.

15. The mold of claim **14**, wherein the means for joining each cylinder to the container comprises attaching each cylinder to the container with an adhesive.

16. A mold for making ice comprising:

a container having at least one hole in the top,

a cylinder inserted into each hole in the top of the container, each cylinder open at the top, closed at the bottom, composed of metal, and oriented vertically,

means for joining each cylinder to the container,

an additional hole in the top of the container for filling the container with water.

17. The mold of claim **16**, wherein the means for joining each cylinder to the container comprises attaching each cylinder to the container with an adhesive.

18. The mold of claim **16**, wherein the means for joining each cylinder to the container comprises holding each cylinder in tension with a hole in the top of the container.

19. The mold of claim **16**, wherein the container has at least one integral platform extending up from the bottom of the container, each platform positioned coaxially with a hole in the top of the container.

20. The mold of claim **19**, wherein the means for joining each cylinder to the container comprises joining each cylinder to an integral platform by a molded snap ring.

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