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(54) **PACKAGING AND SHIPPING SYSTEM FOR A DRY CHARGED BATTERY**

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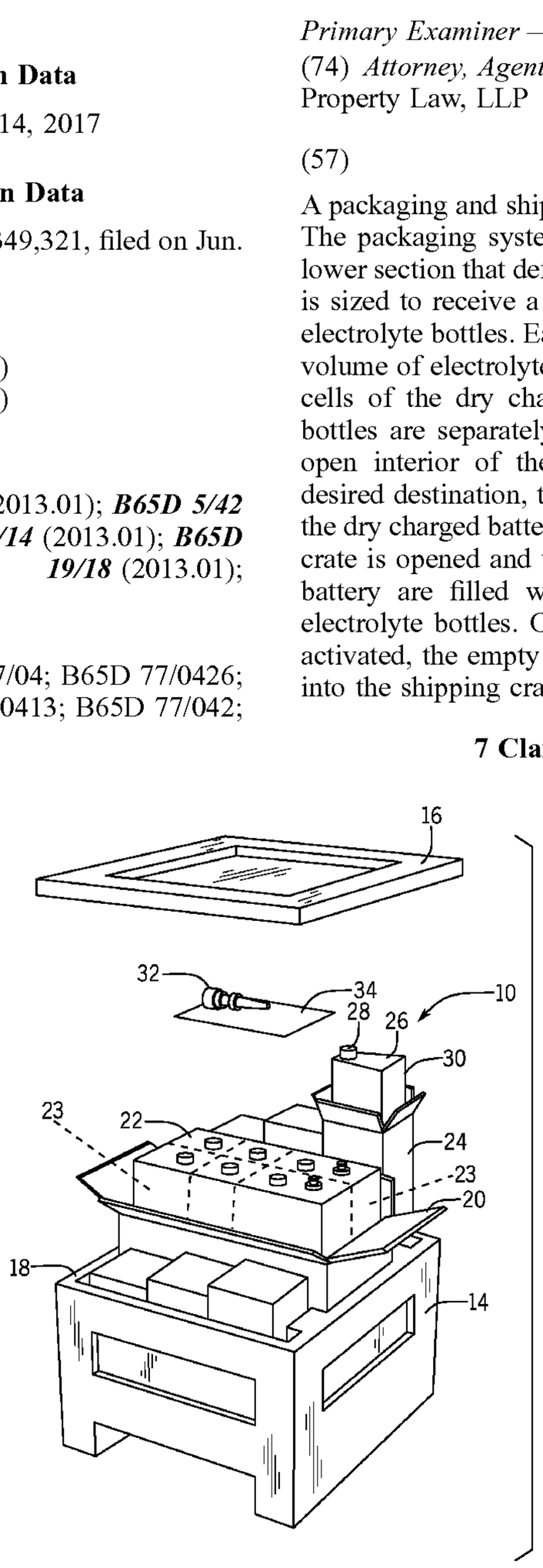
(57) **ABSTRACT**

A packaging and shipping system for dry charged batteries. The packaging system includes a shipping crate having a lower section that defines an open interior. The open interior is sized to receive a dry charged battery and a plurality of electrolyte bottles. Each of the electrolyte bottles contains a volume of electrolyte sufficient to fill one of the individual cells of the dry charged battery. Each of the electrolyte bottles are separately packaged and positioned within the open interior of the shipping crate. Upon reaching the desired destination, the shipping crate can be stored. When the dry charged battery is to be placed into use, the shipping crate is opened and the individual cells of the dry charged battery are filled with electrolyte from the plurality of electrolyte bottles. Once the dry charged battery has been activated, the empty electrolyte bottles can be placed back into the shipping crate and returned for recycling.

7 Claims, 2 Drawing Sheets



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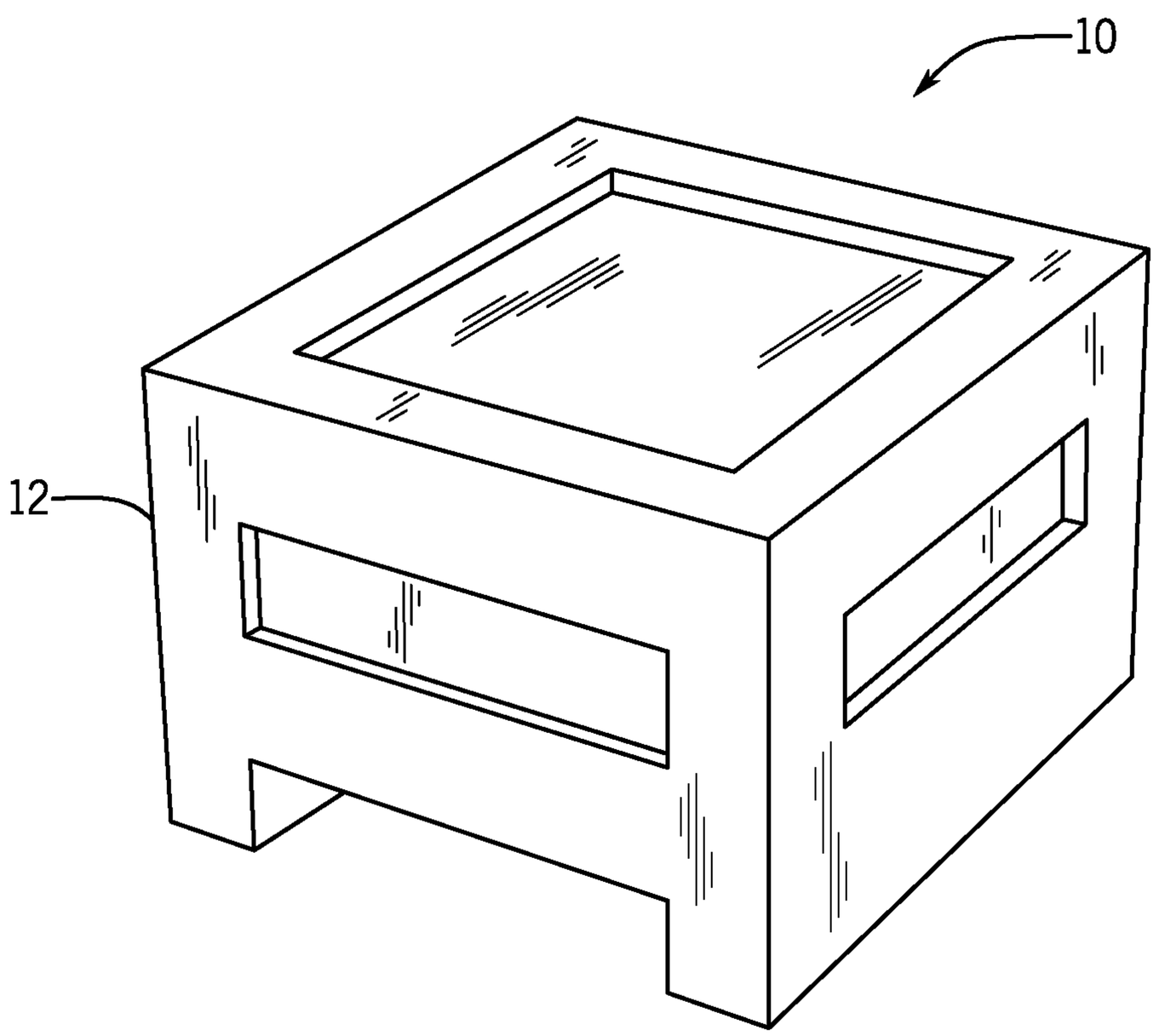

FIG. 1

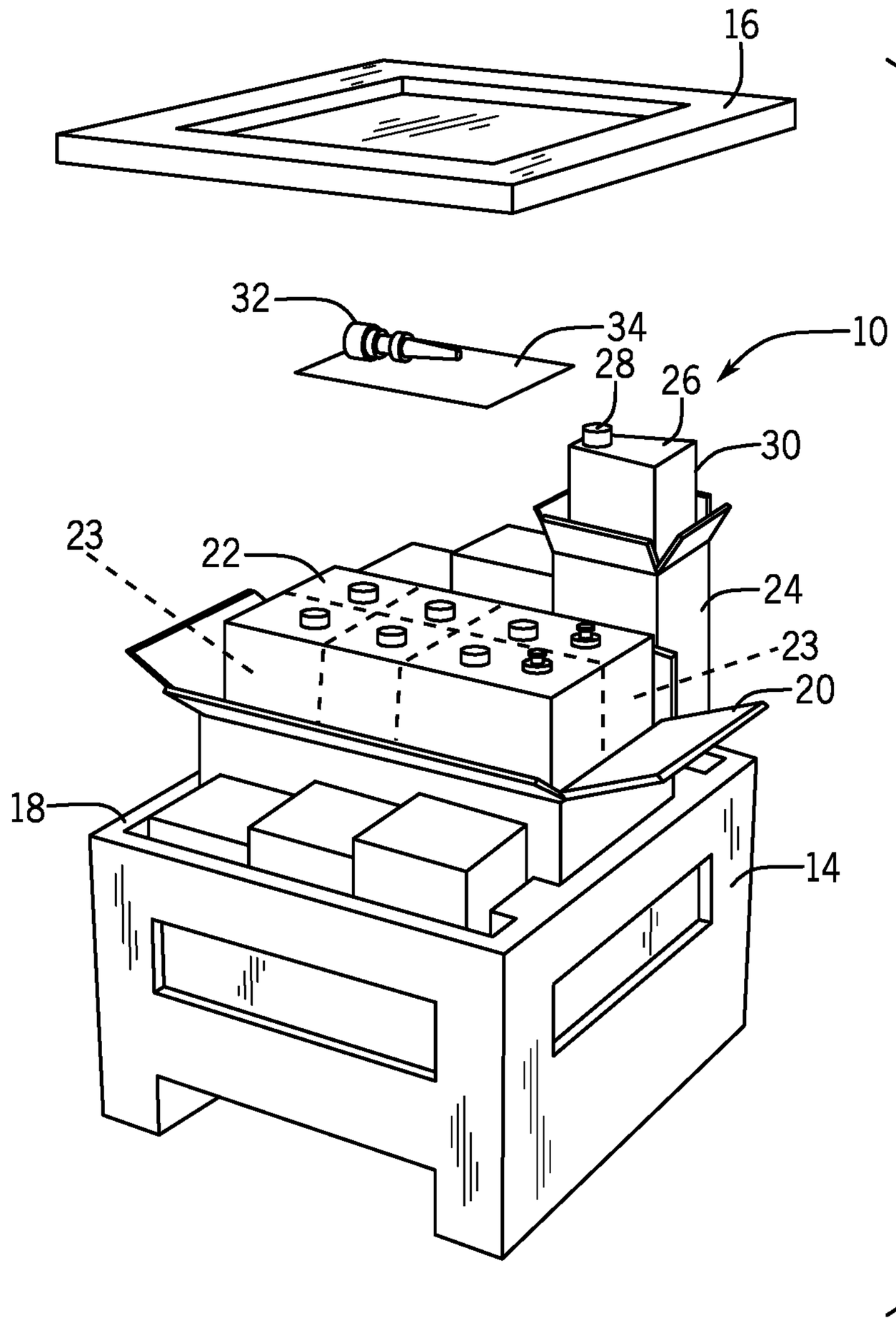

FIG. 2

PACKAGING AND SHIPPING SYSTEM FOR A DRY CHARGED BATTERY

CROSS REFERENCE TO RELATED APPLICATION

The present application is based on and claims priority to U.S. Provisional Patent Application Ser. No. 62/349,321 filed on Jun. 13, 2017, the disclosure of which is incorporated herein by reference.

BACKGROUND

The present disclosure generally relates to a packaging and shipping system for dry charged batteries. More specifically, the present disclosure relates to a system and method for packaging dry charged batteries, including individual bottles of electrolyte needed to activate the battery, in a convenient shipping container.

Presently, dry charged batteries exist that include a battery shell that define a plurality of battery cells. The dry charged battery is shipped without electrolyte. When the battery is placed into service, the individual cells of the dry charged battery is filled with electrolyte and charged. Batteries of this type have a long shelf life since the electrolyte is placed into the battery shell at the time the battery is put into use.

Although dry charged batteries can be stored for a long time before being filled with electrolyte, large volumes of electrolyte must be shipped to storage/charging locations where the dry charged batteries are filled with the electrolyte prior to being placed into use. The electrolyte is typically some type of acid, which is classified as a hazardous liquid. Dry charged batteries are typically filled from a large container of electrolyte, which creates storage issues, transportation issues and filling issues. Specifically, the acid that is used to fill the battery cells must be specially shipped, which increases both the risk and cost for transporting such hazardous liquid.

Therefore, a need exists for an improved system for packaging, shipping and filling dry charged batteries.

SUMMARY

A packaging and shipping system for dry charged batteries is shown and described. The packaging system includes a shipping crate having a removable cover and a lower section that defines an open interior. The open interior is sized to receive the dry charged battery shell, which includes a plurality of individual battery cells. Each of the battery cells has a cell volume designed to receive an amount of electrolyte.

The packaging and shipping system further includes plurality of electrolyte bottles. Each of the electrolyte bottles is sized to contain a volume of electrolyte that corresponds to the cell volume. In this manner, each electrolyte bottle includes enough liquid to fill one of the individual cells within the dry charged battery shell. Each of the electrolyte bottles are separately packaged and positioned within the open interior of the shipping crate. The individual electrolyte bottles can each be contained in a plastic bag and cardboard/paperboard box within the shipping crate for further protection/containment during shipping and storage.

Upon reaching the desired destination, the shipping crate can be stored. When the dry charged battery is to be placed into use, the shipping crate is opened and the individual cells of the dry charged battery shell are filled with electrolyte from one of the plurality of electrolyte bottles. Once the dry charged battery has been activated, the empty electrolyte bottles can be placed back into the shipping crate along with the spent lead acid battery and returned for recycling.

Various other features, objects and advantages of the invention will be made apparent from the following description taken together with the drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

The drawings illustrate the best mode presently contemplated of carrying out the disclosure. In the drawings:

FIG. **1** is a perspective view of the shipping and packaging system of the present disclosure; and

FIG. **2** is an exploded front perspective view of the packaging and shipping system showing the individual components of the dry charged battery.

DETAILED DESCRIPTION

Referring first to FIG. **1**, thereshown is the packaging system **10** of the present disclosure. The packaging system **10** is used to ship a single dry charged battery along with the required electrolyte to fill the individual cells of the dry charged battery. In the embodiment shown in FIG. **1**, the packaging system includes a wooden shipping crate having dimensions as illustrated. The shipping crate, as better shown in FIG. **2**, includes a lower section **14** and a cover **16**. Although specific dimensions are shown for the shipping crate **12** in FIG. **1**, it should be understood that these dimensions could vary while operating within the scope of the present disclosure. Although the shipping crate **12** is shown as being formed from wood, it should be understood that the shipping crate **12** could be formed from other durable material, such as cardboard, paperboard or plastic.

Referring now to FIG. **2**, the lower section **12** has an open interior **18** that is sized to receive a battery box **20** that includes the dry charged battery shell **22**. In the embodiment shown in FIG. **2**, the dry charged battery shell **22** is a six cell dry charged battery shell, although other sized batteries are contemplated as being within the scope of the present disclosure. Each of the plurality of cells **23** in the dry charged battery shell **22** is separate and has a cell volume, which is the volume of electrolyte needed to fill the cell. As an example, the dry charged battery shell **22** could have a cell volume of 1 liter, although other volumes are contemplated for different sized batteries. When the dry charged battery is initially shipped in the crate **12**, each of the battery cells **23** in the shell **26** is empty and does not include any electrolyte.

When the dry charged battery is going to be placed into service, each of the battery cells **23** must be filled with electrolyte. During initial filling and charging of the dry charged battery, each of the six individual cells **23** within the dry charged battery shell **22** must be separately filled with electrolyte. Since each of the cells **23** has the same size and cell volume, each cell receives approximately the same volume of liquid electrolyte.

In the embodiment shown in FIG. **2**, the lower section **14** of the shipping crate **12** is sized to receive six electrolyte boxes **24** that each in turn receives an electrolyte bottle **26**. Each electrolyte bottle **26** is designed to have a volume that is the same as the cell volume. In this manner, each of the bottles **26** is sized to hold the required amount of electrolyte for filling one of the individual cells within the dry charged battery **22**. Each of the electrolyte bottles **22** are separately packaged and positioned within the open interior of the shipping crate. The individual electrolyte bottles can each be

contained in a plastic bag and the cardboard/paperboard box **24** within the shipping crate **10** for further protection/containment during shipping and storage.

Since each electrolyte bottle is a separate container having its own sealing cap **28** and body **30**, most sizes of the electrolyte bottles **26** will include a volume of electrolyte that falls well below the DOT limitations for shipment of hazardous liquids and meets the exemptions for the shipments of limited quantities of battery acid in an acid pack container. Thus, the packaging system **10** allows the dry charged battery shell **22** and the six electrolyte bottles **26** to be shipped utilizing conventional shipping services, such as Federal Express or UPS.

In addition to the six individual electrolyte bottles **26** and the dry charged battery shell **22**, the packaging system can also include a funnel **32**, a filling and charging instruction sheet or sheets **34**, safety data sheets (SDS), safety glasses, an apron and protective gloves. Thus, the packaging system **10** forms a complete unit that can be unpacked and used to initially fill the dry charged battery **22**.

As described above, the packaging system **10** includes a shipping crate **12** that is sized specifically to receive the dry charged batteries and the six packaged electrolyte bottles **26**. The shipping crate **12** provides for more efficient packaging, which allows for more dry charged batteries to be placed on a pallet which frees up storage space. The packaging system **10** provides a complete solution that includes everything needed to activate the dry charged battery. Since each of the electrolyte bottles **26** is of a specified volume, an exact amount of electrolyte can be loaded into each of the cells **23** of the dry charged battery. The manufacturer of the dry charged battery can thus control the amount and type of electrolyte loaded into the battery, which leads to proper activation, longer battery life and better performance.

Since each electrolyte bottle **26** includes the desired amount of electrolyte for each cell **23**, there is less mess in filling each individual cell **23**. Further, the funnel **32** can be specifically designed to work with the dry charged battery shell **22** and electrolyte bottles **26** included within the packaging system **10**.

In accordance with the present disclosure, each of the electrolyte bottles **26** is formed from polypropylene which can be returned to the battery shipping company for recycling along with spent batteries. Other materials can be used for the electrolyte bottles **26**, such as HDPE or glass. It is preferred that the material used for the bottles **26** is recyclable, but other materials could be used in alternate embodiments. The entire packaging system **10** is reverse shippable and can be used to return scrap batteries and empty electrolyte bottles for proper recycling.

As can be understood in the above disclosure, the shipping crate **12** can be designed to accommodate various different sized dry charged batteries **22** and thus different volume electrolyte bottles **26**.

This written description uses examples to disclose the invention, including the best mode, and also to enable any person skilled in the art to make and use the invention. The patentable scope of the invention is defined by the claims, and may include other examples that occur to those skilled in the art. Such other examples are intended to be within the scope of the claims if they have structural elements that do not differ from the literal language of the claims, or if they include equivalent structural elements with insubstantial differences from the literal languages of the claims.

What is claimed is:

1. A packaging, shipping and storage system for a dry charged battery, comprising:

a shipping crate including a lower section and a cover, wherein the lower section defines an open interior;

a dry charged battery shell positioned within the open interior of the lower section, the dry charged battery shell having a top, a bottom, a pair of sidewalls and a plurality of battery cells each having a cell volume;

a plurality of separate and independent electrolyte bottles each sized to receive a volume of liquid equal to the cell volume, wherein the plurality of electrolyte bottles are contained within the open interior of the lower section and positioned adjacent the sidewalls of the battery shell within the open interior of the lower section.

2. The system of claim **1** wherein the plurality of electrolyte bottles includes a first number of electrolyte bottles and the plurality of battery cells includes a second number of battery cells, where the first number and the second number are equal.

3. The system of claim **1** wherein the shipping crate is sealed.

4. The system of claim **1** wherein each of the electrolyte bottles is contained within a separate box.

5. The system of claim **1** wherein the dry charged battery shell is contained within a battery box received within the open interior of the lower section.

6. The system of claim **1** wherein each of the electrolyte bottles is formed from polypropylene.

7. A packaging, shipping and storage system for a dry charged battery, comprising:

a shipping crate including a lower section and a cover, wherein the lower section defines an open interior;

a dry charged battery shell positioned within the open interior of the lower section, the dry charged battery shell having a top, a bottom, a pair of sidewalls and a plurality of battery cells each having a cell volume;

a plurality of separate and independent electrolyte bottles each sized to receive a volume of liquid equal to the cell volume, wherein the plurality of electrolyte bottles are contained within the open interior of the lower section and positioned adjacent the sidewalls of the battery shell within the open interior of the lower section,

wherein the plurality of electrolyte bottles includes a first number of electrolyte bottles and the plurality of battery cells includes a second number of battery cells, where the first number and the second number are equal, and

wherein each of the electrolyte bottles and the dry charged battery shell are contained within a separate box each received within the open interior of the lower section.

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