hingedly mounted to the lower end of walls 30, 32, 34, and 36 and can operate in the same way as panels 38.

[0156] In other embodiments, container 12 can have different configurations. For example, encircling sidewall 24 of container 12 need not have a square or rectangular transverse cross section but can be circular, oval or have other polygonal transverse cross sections that extend between a top wall and an opposing bottom wall. Other shapes and configurations can also be used.

[0157] The size of container 12, and thus the size of interior volume 22, can vary depending in part on the size of the item to be shipped and the duration that the item needs to be kept cold therein. In some embodiments, container 12 can be sized so that interior volume 22 has a volume of at least or less than 1,500 cm^3, 3,000 cm^3, 8,000 cm^3, 0.027 m^3, 0.125 m^3 or is in a range between any two of the foregoing values. Other volumes can also be used.

[0158] Container 12 is commonly comprised of one or more flexible sheets comprised of cellulose material, such as wood, cotton, cloth, and/or recycled paper. More commonly, container 12 is comprised of one or more sheets of paper such as paperboard. The paperboard can be flat (i.e., have no corrugation), corrugated or be the combination thereof. The paperboard commonly comprises cardboard, such as corrugated cardboard. Thus, container 12 can comprise a conventional cardboard box. The flexible paperboard or cardboard used to form container 12 is typically foldable and has a thickness in the range of between 0.8 mm and 5 mm and more commonly between 0.8 mm and 3 mm or between 1 mm and 3 mm.

[0159] To help improve the insulating capability of container 12, a water impermeable coating can be applied on exterior surface 18 and/or interior surface 20. The coating can be a plastic. The coating is preferably a biodegradable material such as a biodegradable polymer like polyethylene (PE) or polylactide (PLA). The coating can be sprayed, painted, printed, or otherwise applied during or after the formation of the sheet used to form container 12. The coating could also be applied while container 12 is being formed or after container 12 is formed.

[0160] In the embodiment depicted in Figure 1, liner 14A comprises a first liner portion 50A and a second liner portion 50B that can both be selectively folded into a U-shaped configuration. Turing to Figure 2, liner portion 50A is unfolded into a flat configuration. In general, liner portion 50A comprises a tubular sleeve 52A that bounds a channel 54A extending along the length thereof. In the depicted embodiment, channel 54A has a

the top or bottom of item for shipping 102. In yet other embodiments, cold source 100 could be applied only against one or more of the sides of item for shipping 102 and against one or both of the top or bottom of item for shipping 102. In one embodiment, item for shipping 102 can be frozen or chilled prior to placement within compartment 96 and can function as the cold source. That is, no additional cold source other than item for shipping 102 is positioned within compartment 96.

[0183] As previously noted, the size of container 12 is dependent upon the size of item for shipping 102 and the duration that item for shipping 102 needs to be kept cold. That is, as the size of item for shipping 102 increases and/or the time during increases for retaining item for shipping 102 cold increases, the size of container 12 increases. By increasing the size of container 106, the size of compartment 96 can also be increased, thereby making more space for additional quantities of cold source 100. Packaging system 10 is typically configured to hold compartment 96 or item for shipping 102 contained therein to a temperature of less than 11° C, 8° C, 2° C, or -10° C for a period of time of at least 10 hours, 15 hours, 20 hours, 30 hours, 40 hours or 50 hours or for a range of time between any two of the foregoing values, e.g., between 10 and 40 hours.

[0184] In some embodiments, not all of the space required by compartment 96 may be needed. In this embodiment, a filler can be placed within compartment 96 to occupy the unneeded space. For example, depicted in Figure 12, filler 110 is located within compartment 96 between cold source 100 and leg 94A of liner portion 50A. In one embodiment, filler 110 can comprise additional sheet of insulation sheets 56A. In other embodiments, filler 110 can comprise conventional dunnage, wadding stuffing, padding or other packaging material used to occupy space and is typically a recyclable, biodegradable and/or cellulose material.

[0185] Select embodiments of packaging system 10 can have a number of unique advantages. For example, in one embodiment, container 12 and liner 14 can be made exclusively of biodegradable and/or recyclable materials, thereby making packaging system more environmentally friendly. Thus, container 12 and liner 14 can be free of polymeric foam, such as expanded polystyrene, and non-biodegradable plastics.

[0186] Liner 14A described herein also achieves unique advantages for packaging system 10. For example, using sleeve 52 in combination with insulation sheets 56, as opposed to just using insulation sheets 56, achieves surprising and unexpected results. That is, while insulation sheets 56 help capture and retain pockets 85 of air so as to improve insulating capabilities, the use of sleeve 52 improves insulation beyond what would be

expected based simply on the added thickness of material. For example, because sleeve 52 is made of a material that is stiffer and more resilient than insulation sheets 56, sleeve 52 helps prevent or limit the compression of insulation sheets 56 caused by cold source 100 and/or item for shipping 102. That is, without sleeve 52, cold source 100 and/or item for shipping 102 presses against insulation sheets 56 simply by their weight and/or as a result of the movement of packaging system 10 during transport. The compression of insulation sheets 56 compresses or removes air pocket 85, thereby decreasing the insulating capability. In contrast, limiting the compression of insulation sheets 56 helps to maximize and maintain air pockets 85 and thus improves insulating capabilities throughout the shipping process.

[0187] Furthermore, as dry ice evaporates it creates a gas. Where sleeve 52 is not used, the gas can more freely pass through insulations sheets 56 causing air within pockets 85 to flow, thereby decreasing insulating capabilities. In contrast, by surrounding insulation sheets 56 with sleeve 52, the gas is directed to flow out through cracks between liner portions 50A and 50B and less through insulation sheets 56, thereby again increasing insulating capabilities of liner 14A.

[0188] The use of sleeves 52 around insulation sheets 56 also achieve other benefits. For example, sleeves 52 have relatively rigid properties, both because they are made of a more rigid sheet than insulation sheets 56 and because they are formed into a tube-like structure which has improved mechanical strength relative to a flat sheet, e.g., a tube has greater strength to resist compression and has greater strength to resist buckling along its length than a flat sheet. As a result, placing liner 14 around the interior surface of container 12 significantly improves the structural strength of container 12 and thereby helps to prevent or limit damage to container 12 during shipping of item for shipping 102. Limiting damage to container 12 is useful since damage to container 12 can significantly decrease the insulating capabilities of packaging system 10 and thereby jeopardize the viability of item for shipping 102.

[0189] In alternative embodiments, it is appreciated that liner 14 can have a variety of different configurations. For example, depicted in Figure 13 is an alternative configuration of a liner 14B that can be used in embodiments of the present disclosure. Like features between liners 14A and 14B are identified by like reference characters. Liner 14B is configured to be received within interior volume 22 of container 12 so as to bound compartment 96 therein. Again, compartment 96 is configured to house cold source 100 and item for shipping 102 therein, the same as discussed above with regard to liner 14A.

[0218] Because of the relative stiffness of insulation sheets 56A1, in some applications insulation sheets 56A1 can be used as liners without a tubular sleeve encircling insulation sheets 56A1. For example, depicted in Figure 25 is another alternative configuration of a liner 14D that can be used in embodiments of the present disclosure. Like features between liners 14A and 14D are identified by like reference characters. Liner 14D is also configured to be received within interior volume 22 of container 12 so as to bound compartment 96 (Figure 26) therein. Again, compartment 96 is configured to house cold source 100 and item for shipping 102 (Figure 10) therein, the same as discussed above with regard to liner 14A.

[0219] Liner 14D comprises a first liner portion 200A and a second liner portion 200B. First liner portion 200A comprises insulation sheets 56A1 wherein the individual sheets thereof have been secured together by an adhesive as previously discussed with regard to Figures 21-23. First liner portion 200A does not include a separate sleeve or sheet, such as tubular sleeve 52A or 52A1, that encircles insulation sheets 56A1. Rather, insulation sheets 56A1 forming first liner portion 200A are configured to sit directly against container 12 and directly bound compartment 96 in which the item for shipped 102 is disposed.

[0220] Insulation sheets 56A1 are cut or otherwise formed so that first liner portion 200A can properly fit within volume 22 of container 12, the same as previously discussed with regard to liner 14A and first liner portion 50A. More, specifically, first liner portion 200A has an interior surface 202A and an exterior surface 204A having a rectangular configuration that longitudinally extends between opposing end faces 206A and 208A and that laterally extend between opposing side faces 210A and 212A. As depicted, first liner portion 200A can be selectively folded into a U-shaped configuration. When in the U-shaped configuration, first liner portion 200A can be defined as having a back 90A with a first leg 92A and a second leg 94A orthogonally outwardly projecting from opposing ends of back 90A. An open channel 95A is bounded between legs 92A and 94A. Legs 92A and 94A can freely pivot relative to back 90A between being disposed in the same plane as back 90A and orthogonally projecting from back 90A, as shown in Figure 25.

[0221] To facilitate folding of first liner portion 200A into the U-shaped configuration, cut lines 214A and 216A can be formed on interior surface 202A and linearly extend between opposing side faces 210 and 212 at the points of folding. In one embodiment, cut lines 214A and 216A can comprise linear cuts that only pass part way through liner portion 200A. Such cuts both form a living hinge and maintain an uncut thickness of liner portion

liner portions 50A and 50B in association with Figures 8 and 9, liner portion 200A can first inserted into interior volume 22 of container 12 by positioning first leg 92A on top of bottom wall 28 and positioning back 90A against encircling sidewalls 24. Back 90A can be disposed against back wall 32 but in other embodiments, it could also be placed against any of walls 30, 34, or 36. First leg 92A can be sized to cover all or substantially all of bottom wall 28 and back 90A can be sized to cover all or substantially all of back wall 32. In this configuration, second leg 94A can still freely pivot.

[0226] Next, the same as previously discussed with regard to the embodiment in Figure 9, liner portion 200B is fitted within channel 95A of liner portion 200A. In this position, liner portion 200B has the same position relative to liner portion 200A as discussed above with regard to Figure 26 and the combination bounds compartment 96. In addition, legs 92B and 94B can be disposed directly against the interior face of sidewalls 34 and 36, respectively, of container 12 and back 90B can be disposed directly against the interior surface of front wall 30 (Figure 25). As previously noted, the combinations of liner portion 200A and liner portion 200B, i.e., liner 14D, can cover all or substantially all of interior surface 20 container 12 when container 12 is folded closed. In the assembled configuration, exterior surface 204 of each liner portion 200A and 200B is disposed adjacent, such as by being disposed directly against, container 12 while opposing interior surfaces 202 disposed adjacent to, such as by directly bounding, compartment 96 configured to receive the item for shipping 102. Cold source 100 and item for shipping 102 can be positioned within compartment 96 of liner 14D the same as previously discussed with regard to liner 14A and Figures 10-11.

[0227] Because insulation sheets 56A1 are more rigid and thus less susceptible to collapsing or compression, relative to insulation sheets 56A, insulation sheets 56A1 can be used to independently form liner portions 200A and 200B without sleeves 52. By eliminating the use of sleeves 52, manufacturing and assembly is simplified and the resulting packaging assembly can be small and/or lighter while still having at least the same thermal efficiency. Other advantages also exist.

[0228] In addition to independently using insulation sheets 56A1 to form liners 200A and 200B, it is also appreciated that insulation sheets 56A1 can also be used to independently form first liner portion 114, second liner portion 116 and third liner portion 118 of liner 14B, previously discussed with regard to Figure 13.The present disclosure may be embodied in other specific forms without departing from its spirit or essential characteristics. The described embodiments are to be considered in all respects only as