United States Patent

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[15] **3,704,823**

[45] **Dec. 5, 1972**

[54] **OPEN-TOP STACKING CARTON AND BLANK THEREFOR**

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[22] Filed: **Dec. 8, 1969**

[21] Appl. No.: **883,216**

[52] **U.S. Cl.** **229/32,** 229/33, 229/40

[51] **Int. Cl.** **B65d 5/18**

[58] **Field of Search**.....229/33 US, 32, 40

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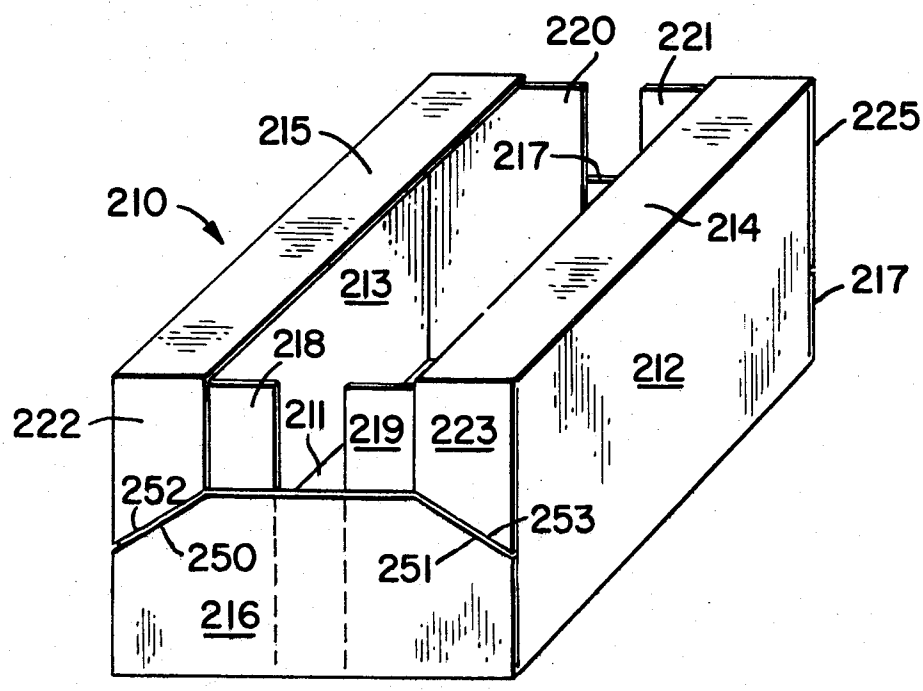
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[57] **ABSTRACT**

A package of containerized goods, a packaging method, and a crate-like carton. The carton has a mostly-open top wall and partly-open front and rear walls, with closed bottom and side walls, all made from a single, continuous, generally rectangular blank of corrugated board. The vertical side walls are hinged to the bottom wall, and a top reinforcing horizontal wall portion is hinged to each of the side walls. Front and rear flaps are attached to each of the bottom, vertical and top walls. The flaps hinged to the bottom wall have a median height no more than half the height of the side walls and are secured to the flaps that are hinged to the side walls, which are substantially less than half as wide as the bottom wall. Also secured to these flaps are the flaps from the top wall, which are narrower than the flaps secured to the side walls. In one form of the invention, the top-wall flaps meet the bottom-wall flaps along a diagonal line. The containers, whether single-tiered or plural-tiered, substantially fill the carton, and individual containers can be taken out through the top of the carton without having to open it. During packaging, the carton is brought snugly around the containers, and this snugness strengthens the carton walls during subsequent stacking of cartons.

3 Claims, 9 Drawing Figures



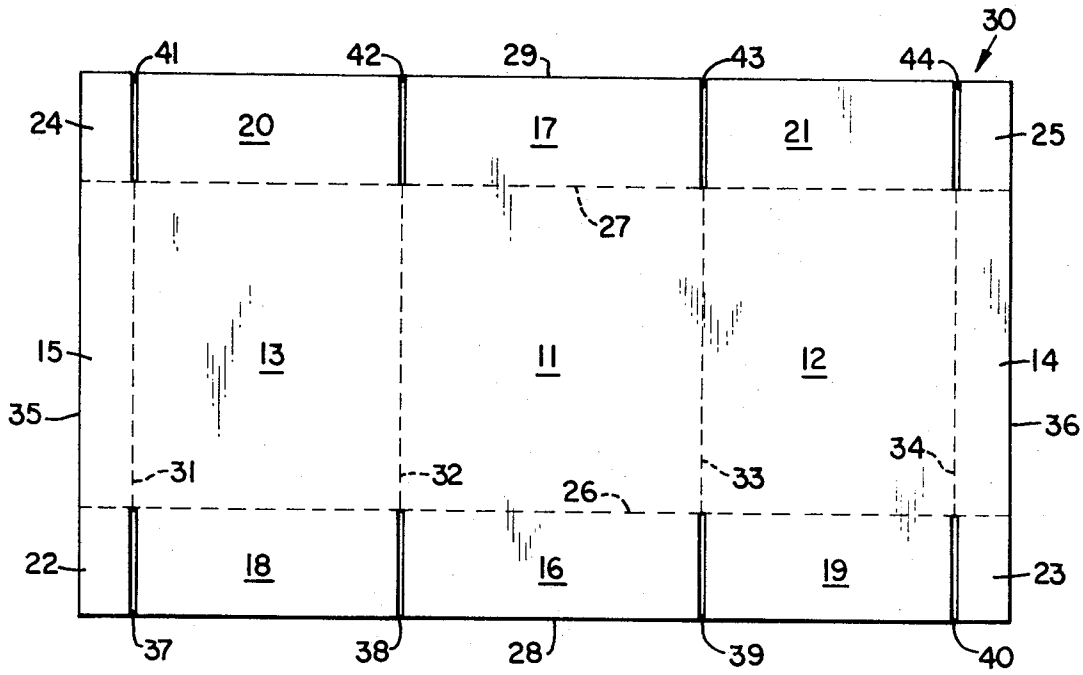


FIG_2

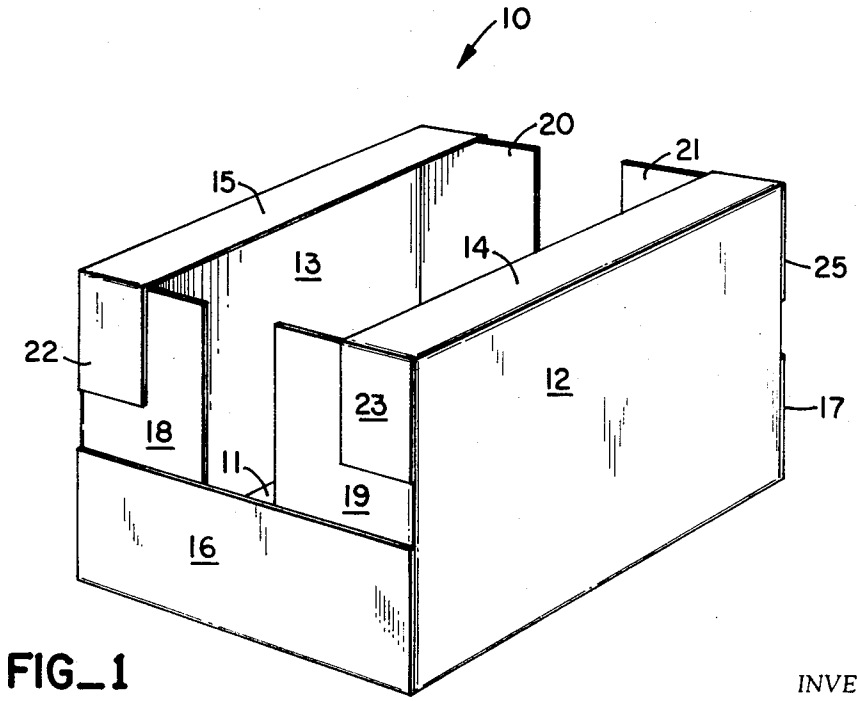


FIG_1

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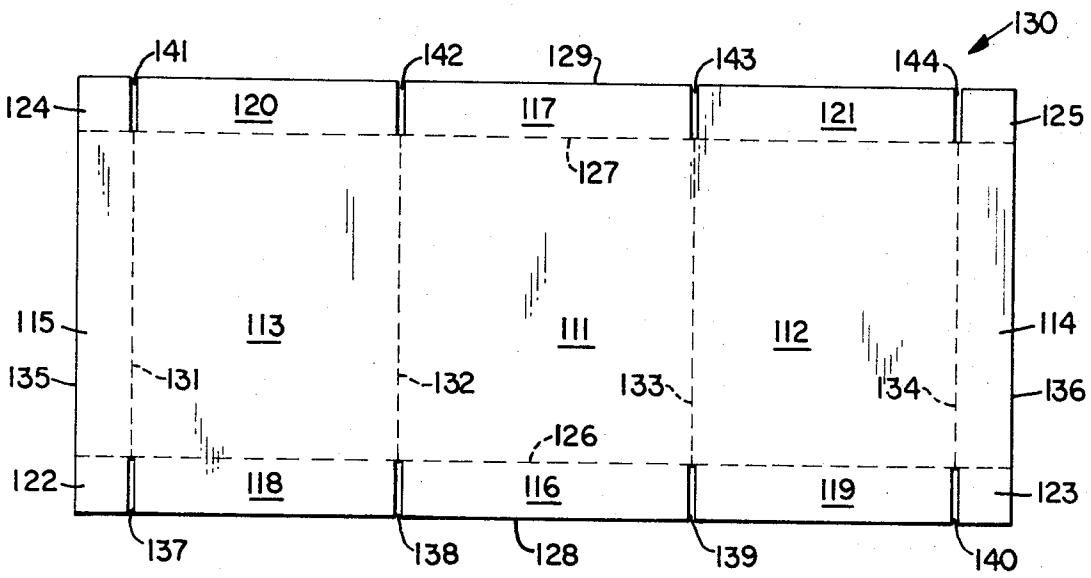


FIG_4

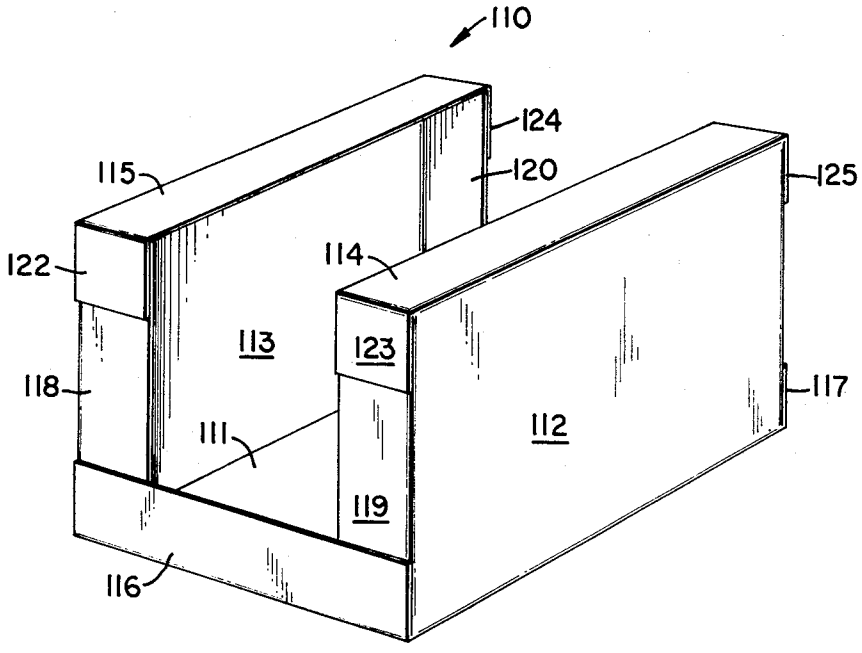


FIG_3

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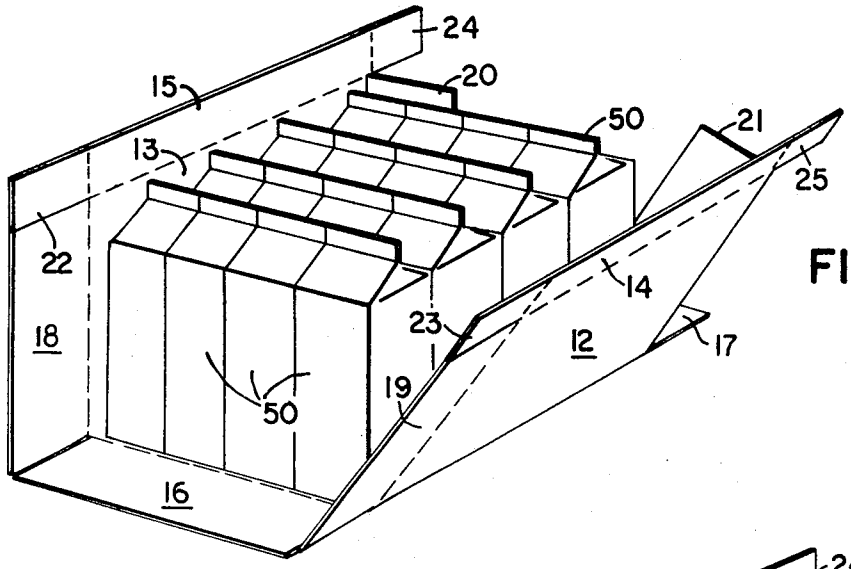


FIG_5

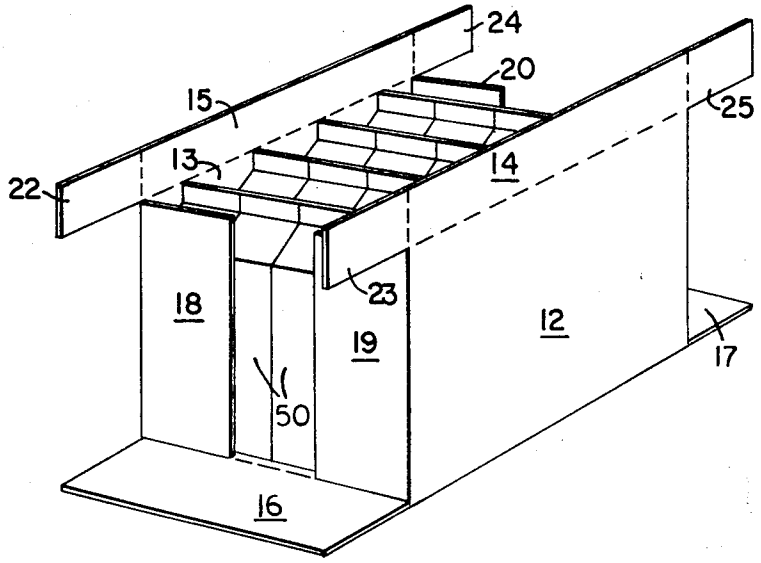


FIG_6

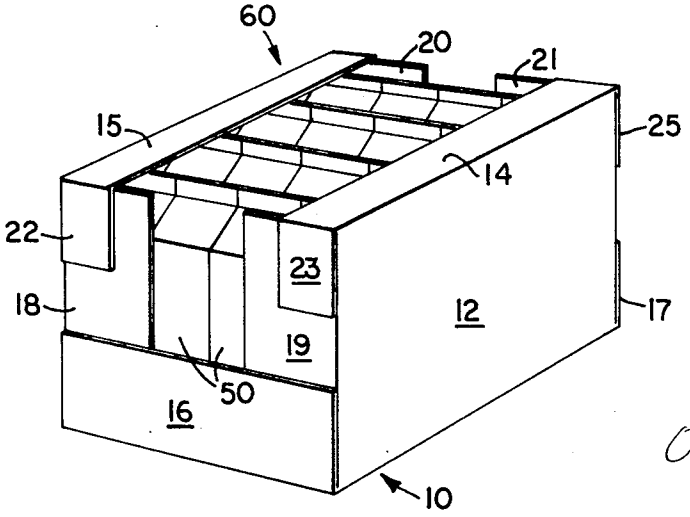


FIG_7

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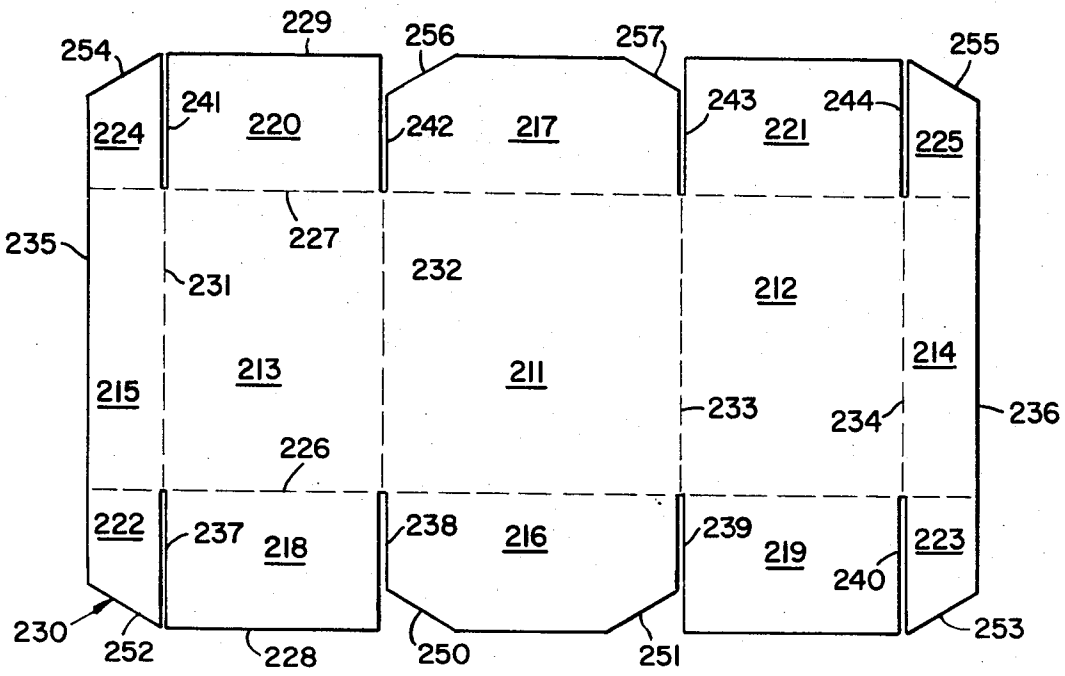


FIG_9

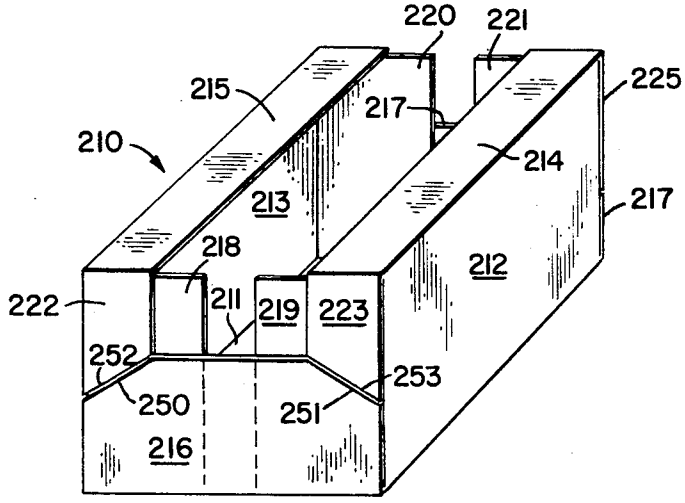


FIG_8

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OPEN-TOP STACKING CARTON AND BLANK THEREFOR

This invention relates to an improved crate-like carton, to a package wherein containers cooperate with the carton to increase stacking strength, and to a method for packaging containers in such a carton.

It has long been the practice in the dairy industry and in some other industries to package products in containers and then to transport the containers in wood, wire, or plastic crates. All of these crates have been too expensive to be economical unless reused many times; so they had to be returned for cleaning and reloading. The crates themselves have been heavy and have taken up a considerable amount of space in the returning truck, and they required storage space in the plant where they had to be re-processed before reuse. Also, the fact that they were to be returned was coupled with the fact that returns were necessarily delayed for the period of distribution and sale, so that each distributor had to buy and to maintain about four to six times as many crates as were actually being distributed at any one time. Necessarily, special cleaning and special handling equipment was required at the plant, and additional employees were required to perform the necessary operations of handling the crates, storing them, and re-processing them.

While these crates have long been tolerated, it has also long been known that they failed to protect the individual packages from damage, except for helping to prevent top crushing. There was no protection from side damage, and the fit within the crate could not be snug enough to avoid internal damage within the crate. The dead weight of the crates themselves necessarily reduced the net weight of the payload on distributing trucks and required more effort and more mechanical aids in loading and unloading.

The present invention employs a light-weight corrugated crate-like carton made very economically from a generally rectangular blank that is cut and scored to provide flaps and fold lines. This crate-like carton is quite different in its structural formation from the wooden, wire, and plastic crates that have been used, and this new carton results in a better package as well as a more economical package.

Among the advantages achieved by this invention are the following:

1. The crate-like carton is stored as a flat blank before use; therefore, it takes up much less space in the packaging plant.

2. The carton is so inexpensive that there is no reason for returning it; it is more economical to destroy it, thereby saving the costs of return and costs of storage, as well as eliminating all the attendant fringe deficiencies of such return systems. Thus, there is no necessity for having storage space for empties, no need for maintaining inventory on the cartons once they have been used, and so on.

3. Since the carton is not returned, there is no necessity to maintain crate-cleaning machinery, and employees formerly engaged in crate cleaning and related operations are freed for other more remunerative functions.

4. The carton is so much lighter in weight than the crates it replaces that it enables a substantial increase in the distribution payload. It is much easier to handle and requires less labor in handling. other.

5. The carton protects the contents much better than did the crates, because it protects the contents against damage from all sides, as well as from top crushing, and the fit can readily be made quite snug, so that the packaged containers do not move around and damage each other

6. The crate-like carton is unlike ordinary cardboard cartons, in that it does not need to be opened, nor do any of the flaps have to be unfastened, for the contents are accessible from the top without having to do this.

7. The carton, being made of corrugated paper board is made by standard and conventional corrugating machinery methods and materials, and it enables the use of automatic packaging machinery in the distributor's packaging plant.

8. It is possible to use one size of carton for a great many sizes of standard dairy containers, and it is also very simple to provide different sizes of cartons without having to make drastic changes in the manufacturing machinery for the carton. The packaging machinery may or may not have to be different, depending upon the particular packaging that is used, but in any instance it is relatively inexpensive and relatively quickly adaptable, as compared with what was required with former types of crates.

In one form of the invention, improved stacking strength is obtained by a novel double-wall structure at each end of the carton, providing a diagonal line of abutment of the flaps that provide the outer lamination of the double wall. This diagonal line of abutment prevents the creasing or crushing that tends to take place, under load, between flaps that meet along a horizontal line or do not meet at all.

Other objects and advantages of the invention will appear from the following description of some preferred forms thereof:

In the drawings:

FIG. 1 is a view in perspective of a crate-like carton embodying the principles of the invention. It is shown empty, for a clearer showing of its construction, though in practice it is not usually assembled empty.

FIG. 2 is a top-plan view of the blank from which the carton of FIG. 1 is made.

FIG. 3 is a view similar to FIG. 1 of a modified form of crate-like carton also embodying the principles of the invention.

FIG. 4 is a view similar to FIG. 2 of a blank from which the crate of FIG. 3 is made.

FIG. 5 is a view in perspective of a partly assembled package, illustrating one method, embodying the invention, of packaging employing the crate-like carton of FIGS. 1–4.

FIG. 6 is a view in perspective of a subsequent stage in this same method.

FIG. 7 is a view in perspective of a completed package embodying the principles of this invention.

FIG. 8 is a view similar to FIG. 1 of another modified form of crate-like carton, also embodying the principles of the invention.

FIG. 9 is a view similar to FIG. 2 of the blank from which the crate-like carton of FIG. 8 is made.

In FIG. 1, a crate-like carton **10** is shown assembled but empty, for purposes of explanation, although the carton is seldom put together without contents. The carton **10** has a bottom wall **11**, vertical side walls **12**

and exhibits the requisite kinetics of water vapor adsorption.

7. An enclosure for providing a moisture-free environment comprising a container for said environment, having at least some portion of its inner surface coated with a film of the desiccant composition of claim 1.

8. A hemetically sealable container for providing a moisture free environment for enclosing moisture sensitive equipment having at least some portion of its inner surface coated with a film of the dehumidifying composition of claim 1.

* * * * *

the erected carton **110**. This carton may be used for large containers with only two rows of containers in the carton. Other examples could be shown, but these suffice to give the principles involved. Once again the principles are the same in both of these crate-like cartons **10** and **110**.

Another quite important modification is a crate-like carton **210**, shown assembled but empty in FIG. **8**, for purposes of explanation. Its blank **230** is shown in FIG. **9**. The carton **210** has a bottom wall **211**, vertical side walls **212** and **213**, and horizontal top walls **214** and **215**. It also has a series of vertical flaps forming the end walls, namely front and rear flaps **215** and **217**, front and rear side flaps **218**, **219**, **220**, and **221**, and front and rear depending flaps **222**, **223**, **224**, and **225**, of which the flaps **223** and **224** are not shown in FIG. **8**. All of these portions, however, are indicated on the blank **230**, shown in FIG. **9**. As FIG. **9** shows, there are two lengthwise fold lines **226** and **227**, which are parallel to lengthwise edges **228** and **229** of the blank **230**. Also, as shown in FIG. **9**, there are four widthwise fold lines **231**, **232**, **233**, and **234**, which are parallel to the widthwise edges **235** and **236** of the blank **230** and extend the full distance between the two lengthwise fold lines **226** and **227**. Each widthwise fold line **231**, **232**, **233**, **234** is succeeded in the space between the lengthwise fold line **226** or **227** and its adjacent lengthwise edge **228** or **229** by a cut directly in line with it which serves to define the various flaps **216** through **225**. Thus, as shown in FIG. **2**, there are cuts **237**, **238**, **239**, **240**, **241**, **242**, **243**, **244**.

The difference between the blank **230** and the blank **30** — and hence between the carton **10** and the carton **210** — lies in matching angular cuts on the flaps. Thus, the bottom flap **216** has angular cuts **250** and **251**, which exactly match an angular cut **252** on the flap **222** and a cut **253** on the flap **223**. Similarly, the flaps **224** and **225** have angular cuts **254** and **255** that exactly match cuts **256** and **257** on the flap **217**. Moreover, the flaps **222**, **223**, **224**, and **225** are so proportioned relatively to the flaps **216** and **217** and both are so proportioned relatively to the flaps **218**, **219**, **220**, and **221** that the edges **250** and **252** exactly meet in the completed carton **210**, as do the edges **251** and **253**. The same applies to the edges **254** and **256** and to the edges **255** and **257**.

Thus, the end walls comprise a double wall over a substantial portion of their area, for the flaps **216**, **222**, and **223** overlie the flaps **218** and **219** over a substantial area; and the flaps **217**, **224**, and **225** similarly overlie the flaps **220** and **221** over a substantial area. Moreover, vertical pressure can be counteracted by the vertical flutes of the corrugation, if the blank **230** is so cut, and by the meeting or abutment of the edges **250**, **251**, **256** and **257**, respectively, with the edges **252**, **253**, **254**, and **255**. A significant point here is the diagonal nature of their abutment -- which may be 30° for economy's sake or may be 45° or 60° or some intermediate amount. It may even be somewhat smaller than 30° but not less than about 15° to achieve the desired result. For the point is that by meeting at an angle, a horizontal bending or creasing of the flutes is avoided, and to achieve a diagonal creasing would require a much larger vertical force than would be required for a horizontal crease or bend. This structure thus affords maximum strength to resist the forces encountered in vertical stacking, within the limits of the general structure.

Note that the median height of the flaps **216** and **217** is the height half way along the angular cut **250** or **251** or **256** or **257**. This median height is exactly half the height of the side walls **212** and **213**, and the median height of the flaps **222**, **223**, **224**, and **225** is also exactly half the height of the side walls **212** and **213**.

Various methods of packaging can employ the cartons or crates of this invention. For example, with all of the walls in place and glued, stitched, or stapled, except the top-wall portions **14**, **15**, and their depending flaps **22**, **23**, **24**, **25**, these being kept vertical for the time, the containers may be placed into the crate-like carton from above. Once they are in place, the top-wall portions **14** and **15** and the depending flaps **22**, **23**, **24**, and **25** are then secured in place. This is an economical and perfectly usable method, and it may be done with the carton **10** resting on its side, if that is advantageous.

However, FIGS. **5** and **6** illustrate another method, which in many instances is preferable. In this method, the side wall **13** on one side only is erected, and one side flap **20** may be also erected in its final position, or a barrier may be placed at that rear end, occupying about the position that the rear flap **17** will ultimately take. The top-wall portion **15** and its depending flaps **22** and **24** and the side flap **18** (and possibly the side flap **20**) remain vertical at this stage. At this stage, the other side wall **12** may be at a suitable angle, as shown, to avoid consuming the space it would take if it were horizontal, but it should not yet be vertical. The front flap **16** should be held horizontal, and the containers **50** to be put in may then be slid horizontally over the flap **16** and into place, or they may be placed in from above.

After the carton **10** has been filled, in either instance, the flaps **18** and **19** are brought in to their position perpendicular to their walls **12** and **13**, and so are the flaps **20** and **21**, if not so brought in earlier. Then the side wall **12** is erected, as shown in FIG. **6**, and the containers **50** are squeezed between the walls **12** and **13**.

Finally, as shown in FIG. **7**, the front and rear flaps **16** and **17** are brought up to their vertical position and are glued, stitched, stapled, or heat sealed to the front and rear side flaps **18**, **19**, **20** and **21**, squeezing the containers from each end toward the center. Simultaneously, the top walls **14** and **15** are folded down, and their depending flaps **22**, **23**, **24**, and **25** are folded down and are stitched, glued, stapled, or heat sealed to the front and rear side flaps **18**, **19**, **20** and **21**.

The resulting package **60** (FIG. **7**) is an interesting one for it has several unique characteristics. For one thing, it is already "open" in one sense, — in that no one need destroy the crate or even open any of the flaps in order to gain access to any of the containers **50**. However, if opening the flaps is desired, that can readily be done without any special machinery. In the instance shown in FIG. **7**, where there are 16 quart-size milk cartons **50**, they can all be removed without having to open the carton **10** further. Thus, the containers **50** from the two middle rows can be removed from above; after removal of the more central containers **50**, the other rows are then accessible and the containers **50** in the side rows can be removed from above. This has many advantages, especially in stores where the

The dehumidifier film or coat is strongly bonded to the material of a container being dehydrated, so that no additional means or operations are required for securing said dehumidifier composition in said container.

The method of obtaining the present dehumidifying composition in the form of a film or coat comprises applying onto the inner surface of containers a suspension containing 100 parts by weight of zeolite having a humidity of 20–23 wt. percent, 45–280 parts by weight of a thermosetting resin, 120 parts by weight of an organic solvent intended for dissolving said resin, 0–45 parts by weight of a suitable plasticizer, and 0–85 parts by weight of a curing agent.

The suspension applied onto the inner surface of a container is maintained in the air at a temperature of from 5° to 80° C in order to remove the bulk of volatile components, followed by subjecting said suspension to heat treatment in vacuo at a residual pressure of not greater than 10^{-1} mm Hg and at a temperature of from 150° to 180° C. Said heat treatment removes the last traces of volatile components, brings about binder polymerization and results in the formation of film or coat (layer) depending upon the amount of the suspension used, said film (coat) being characterized by a highly extended porous structure which is adhesively bonded to the coated surface and provides for the requisite kinetics of water vapor adsorption. The porous structure of a dehumidifying composition film is defined by the volume of primary pores in zeolite crystals and by the volume of secondary pores. The volume of secondary pores depends primarily on the dispersity of zeolite crystals and binder (resin) particles, as well as on the nature of the binder used, and the type and density of zeolite crystal and binder particle packing.

The volume of secondary pores in the range of equivalent radii of from 291,000 to 31 A equals 0.044 cm^3/cm^3, a significant portion of said volume (0.020 cm^3/cm^3) being due to the pores in the equivalent radius range of from 98 to 31 Å.

An essential feature of the present dehumidifying composition is that it provides the possibility of controlling the kinetics of adsorption by varying the proportion of components of stock suspensions, so that the present dehumidifying composition can be used in devices and instruments of various types and sizes, the desired kinetics of moisture adsorption inside a given device (instrument being attained by selecting an appropriate ratio of suspension components. As compared to the known dehumidifying agents in the form of tablets or thickened silicone oil-based mixtures, the present dehumidifying composition in the form of a film or coat occupies a very small volume inside casings and has an insignificant weight. Said beneficial characteristics of the present dehumidifying composition make it eminently suited for use in conjunction with microminiaturized electronic instruments. The dehumidifying composition contained in an instrument casing (bulb) can be repeatedly regenerated, thereby making it practicable to have a requisite stock of dehumidifier-coated casings, a further advantage of the present dehumidifier being the absence of oil on the surfaces to be welded and, hence, the ease of sealing hermetically the devices or instruments.

The present dehumidifying composition is employed without resorting to mechanical means for securing said composition in instrument (device) casings or to special-type equipment for introducing said composition into instrument (device) casings and is suitable for being introduced into casings (bulbs) of any shape or size at one and the same production section, the latter feature being highly advantageous for the simultaneous production of diverse types of semiconductor instruments. It is expedient to use the present dehumidifying composition irrespective of the scale or automation degree of production processes or when the manufacture of instrument casings and the assembly of finished semiconductor devices are carried out at different plants.

It follows from the foregoing that the present dehumidifying composition used in the form of a film or coat is commercially superior to the known dehumidifiers.

The following examples are illustrative of the manner of carrying out the invention but are not intended to limit the scope thereof.

EXAMPLE 1.

One hundred parts by weight of Type Na zeolite A (moisture content, 25 percent by weight; particle diameter, 4 mc maximum) is mixed with 100 parts by weight of epoxide resin (molecular weight, 370–450; epoxy group content, 18 percent) dissolved in 127 parts by weight of an organic solvent having the following composition, percent by weight: butyl acetate, 10; cellosolve ($C_2H_5—OCH_2CH_2OH$), 8; acetone, 7; butanol, 15; ethanol, 10, and toluene, 50. Dubutyl phthalate (plasticizer) is added to the stirred mixture in an amount of 5 parts by weight, followed by introducing 10 parts by weight of polyethylene polyamine (curing agent). The resulting mixture is thoroughly mixed to obtain a homogeneous suspension. The dehumidifying composition thus prepared is ready for use.

Use is made of a buret, an atomizer or a syringe to apply the composition on the inner surface of instrument metal casings (bulbs) having a volume of 0.25 cm^3. From 10 to 12 mg of said composition is introduced in each bulb, followed by maintaining the bulbs with said composition applied thereonto for a period of 10–20 hours in the air at ambient temperature in order to remove the bulk of volatile components. Next the bulbs are placed in a vacuum drying cabinet, subjected to gradual heating to a temperature of 180° C at a residual pressure of 0.1 mm Hg, and maintained at this temperature for a period of 3 hours. It is pertinent to gradually heat the composition in order to provide in the resultant film an access of zeolite micropores to the ambient atmosphere and to attain good adhesion of the film to the bulb surface. The resultant film displays heat stability up to a temperature of 200°C in the air. The thus-treated bulbs are ready for use as sealing components of instruments or circuits.

Mechanical tests of the film under the conditions prescribed for testing transistors enclosed in bulbs are indicative of the absence of crumbling, dusting or cracking phenomena.

The film obtained by the procedure described herein before is capable of maintaining in the hermetically sealed volume of the bulb a low relative humidity in the temperature range of from −60° to +150°C.

the full height thereof and each having a bottom edge resting on the bottom wall, each said side flap having an horizontal top edge and a vertical end edge, said side flaps for at least one end having a width along said bottom and top edges substantially less than one-half of the width of said bottom wall between said side flaps,

front and rear flaps hinged to opposite ends of said bottom wall for the full side distance thereof, each splayed at its free corners to provide two diagonal portions, each having a maximum height equal to the width of said front and rear side flaps, and each having a median height no greater than half the height of said side walls and each secured to two said side flaps,

a top reinforcing wall portion hinged along the top edge of each said side wall along a line lying parallel to and distant from the hinge line of said side wall to said bottom wall, each said top wall portion being narrower than the width of said front and rear side flaps along their top and bottom edges and folded to lie horizontally above said bottom wall, and

a depending flap at each end of each said top wall portion and the same width as said top wall portion and the same maximum length as the width of said side flaps along their top and bottom edges, and terminating in a diagonal edge matching the diagonal edge of said front and rear flaps, said depending flaps being secured to said front and rear side flaps above and abutting the diagonal edges of said front and rear flaps respectively.

3. A carton blank, comprising

a generally rectangular sheet of corrugated board having two parallel lengthwise fold lines and four widthwise fold lines parallel to each other and perpendicular to and between said lengthwise fold lines, and cuts in line with each said widthwise fold line and extending from each said lengthwise fold line to its adjacent widthwise edge, said fold lines and cuts thereby defining

a rectangular bottom wall portion centrally located between the edges of said sheet,

two rectangular side wall portions each hinged to said bottom wall portion along a widthwise fold line,

two rectangular top wall portions each hinged to a said side wall portion along a widthwise fold line and terminating in a widthwise edge,

a front flap and a rear flap, each between two said cuts and joined by a said lengthwise fold line to said bottom portion,

two rectangular front and rear side flaps, each between two said cuts and joined to a said side wall portion by a said lengthwise fold line, and extending to a lengthwise edge,

two front and rear final flaps each joined to a said top wall portion by a said lengthwise fold line and each terminating in a diagonal edge which at its farthest from said lengthwise fold line lies at the same distance from said lengthwise fold line as the lengthwise edge of its adjacent side flap,

each of said front flap and rear flap having a lengthwise edge portion collinear with said lengthwise edge of its adjacent side flaps and splayed at the corners to provide two diagonal portions parallel to the diagonal edges of the closer said final flap,

the distance between each said lengthwise fold line and the lengthwise edge of said side flaps being substantially less than half the width of said bottom wall portion along a said lengthwise fold line,

the distance between each said lengthwise fold line and the median of each said diagonal edge, and the distance between each said lengthwise fold line and the median of each said diagonal portion being one-half the width of each said side wall portion along a said lengthwise fold line,

the distance between each said widthwise edge and its adjacent widthwise fold line, being less than the distance between a said lengthwise fold line and the lengthwise edge of its said side flap.

* * * * *