Feb. 28, 1967 W. C. DIESINGER, JR 3,306,517

REINFORCED CARTON AND METHOD OF MAKING IT

Filed June 19, 1964 2 Sheets-Sheet 1

FIG. 1.

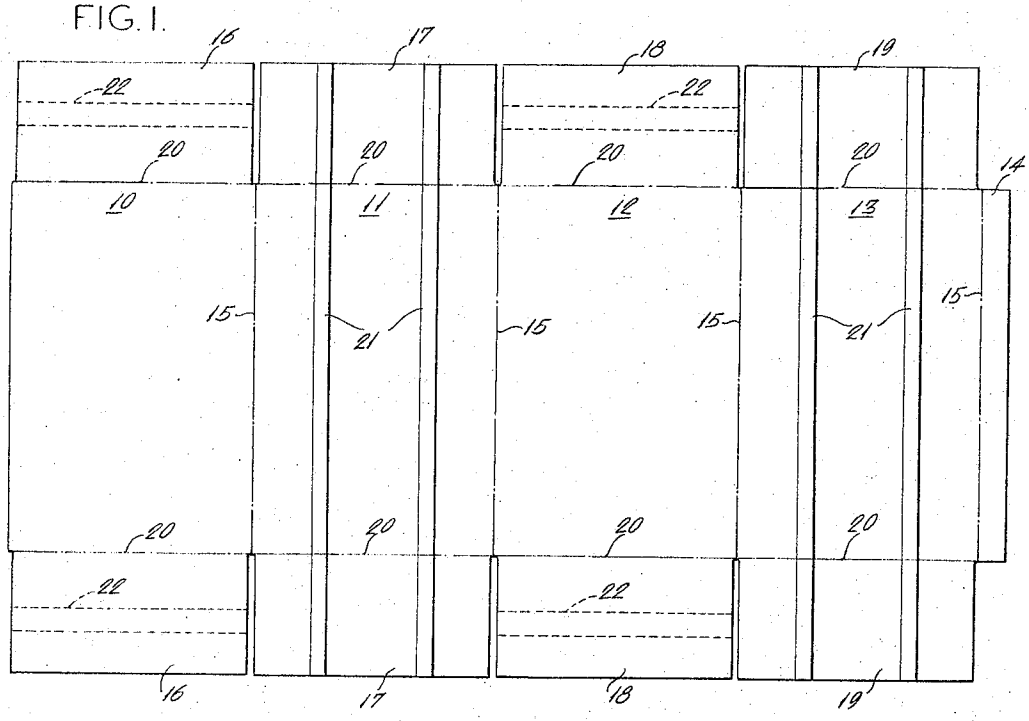


FIG. 2.

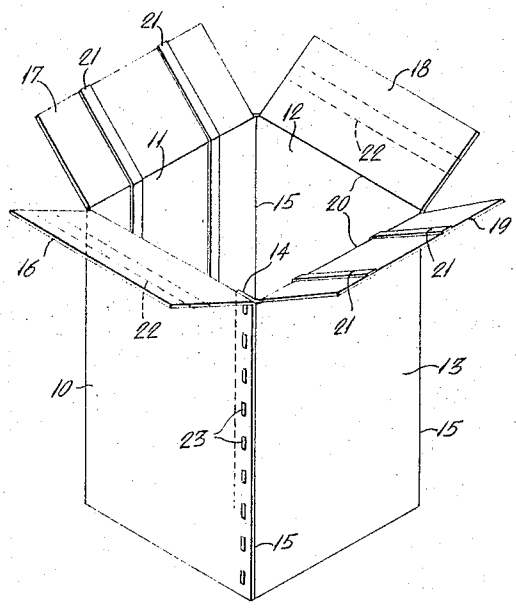
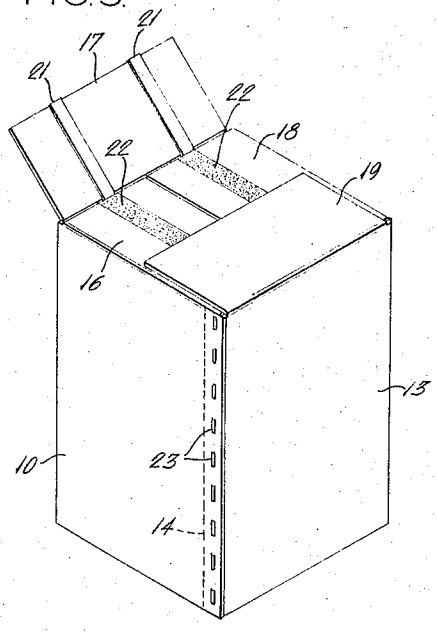


FIG. 3.



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FIG. 4

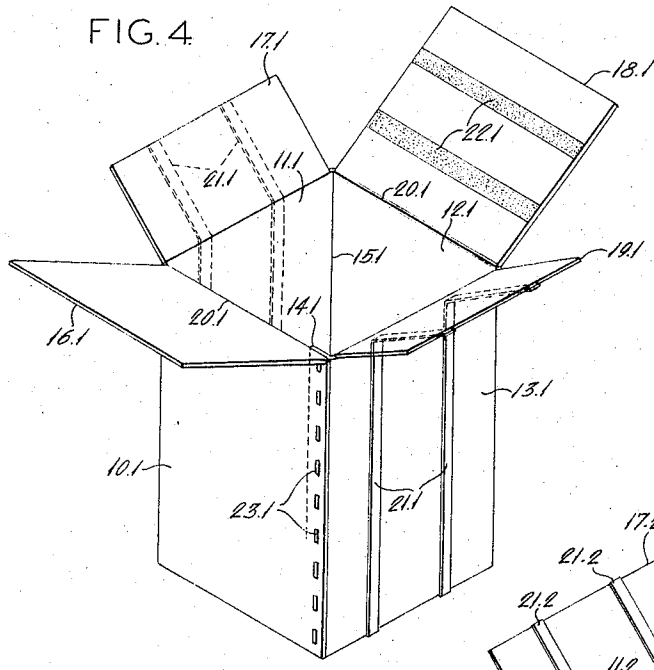


FIG. 5.

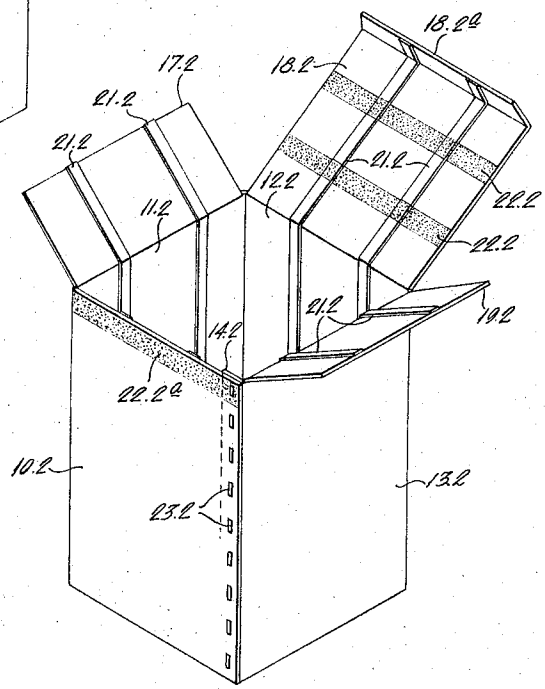
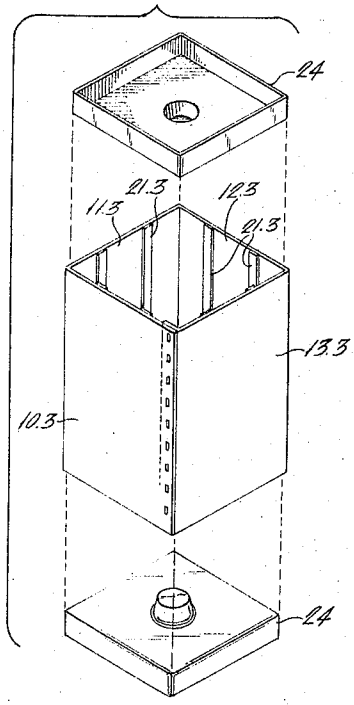


FIG. 6.



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REINFORCED CARTON AND METHOD OF MAKING IT

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5 Claims. (Cl. 229—37)

This invention relates to a reinforced carton and method of making it and has for an object the provision of improvements in this art.

It is a current practice to apply a band or strap to cardboard cartons after they have been closed to prevent bursting with rough handling. Effective banding depends on the skill and care of different operators and adds individual labor costs to the normal operations.

According to the present invention the banding is made a part of the manufacturing procedure thus saving the subsequent banding effort and providing over-all packaging economy. A banded carton can be made of lighter paperboard than unbanded cartons of the same strength and this provides further economy.

One of the particular objects of the invention is to apply to a cardboard or paperboard blank in the flat a reinforcing strip, of a material which is much stronger in tension than the material of the carton, in such manner that when a load-bearing connection is later made between the ends of the strip during assembly or erection there will be provided a full banded effect in the final closed carton. There may be as many bands as desired for the strength required. The carton blanks with the reinforcing strips secured to a surface thereof, as by adhesive, and, preferably, with a carton-sealing coating of adhesive also applied in the flat, are, as is usual with paperboard cartons, united at the flap at the side edges by staples, adhesive or the like to make a full circumferential enclosure which is shipped in the doubled flat condition with the end flaps, when present, left in the extended position. This side edge joint can be conveniently made at the factory, hence is often referred to as the manufacturer's joint.

Another object is to provide an adhesive coating, which may be in the form of a strip, in a position to overlie the reinforcing strip when the carton is finally sealed.

Another object is to provide an improved method of making a carton with a permanently pre-attached reinforcing strip which is effectively formed into a reinforcing band or strap in the final sealed carton.

The above and other objects of the invention will be apparent from the following description of certain exemplary embodiments, reference being made to the accompanying drawings, wherein:

FIG. 1 is a plan view of one form of carton blank having applied thereto reinforcing strips and adhesive to form two vertically disposed reinforcing bands;

FIG. 2 is a top and side perspective view of a partly closed carton formed from the blank of FIG. 1;

FIG. 3 is a view like FIG. 2 but showing the carton in a further stage of completion;

FIG. 4 is a view like FIG. 2 but showing a carton with a different closure flap arrangement;

FIG. 5 is a view like FIG. 2 but showing a carton with another type of closure flap arrangement;

FIG. 6 is an exploded perspective view of another form of carton.

In FIG. 1, the blank shown comprises a plurality of side panels **10**, **11**, **12** and **13** and an edge flap **14**, the panels and edge flap having weakened fold lines **15** between them. The side panels **10**, **11**, **12**, **13**, in this embodiment, have end closure flaps **16**, **17**, **18** and **19** respectively, the end closure flaps and side panels having weakened fold lines **20** between them.

Two alternate panels, which in assembled or erected form stand opposite each other, are provided with at least one, and as here shown two, reinforcing strips **21** of material which has a tensile strength considerably greater than that of the material of which the carton is composed, assumed here to be corrugated core sheet fiberboard. The reinforcing strips are thin and flat and flexible, at least at the fold lines which they cross, and are secured to one surface or face of the sheet by adhesive.

In final assembly the adjacent ends of the reinforcing strip are connected across the gap between them by connecting means which effectively forms a complete circumferential band. Here the reinforcing strip ends on the flaps **17**, **19** lie in a common plane and are connected by the other flaps **16**, **18** which are bonded to the strip-bearing flaps by adhesive coatings **22** which may be continuous over the entire faying flap surfaces or may be applied in lines or stripes, as shown, to cover the reinforcing strips **21**. As here shown, the adhesive coatings **22** are applied to the blank in the flat form and will be on the face opposite that on which the reinforcing strips are secured. Preferably, the reinforcing strips are disposed on the inside surface of the erected or assembled carton, which here places the adhesive coatings on the opposite surface. The inside disposition of the reinforcing strips prevents damage to them by scuffing in handling and leaves the outside of the carton clear for printed matter, which is also usually applied in the flat. Of course, on the folded flaps both the reinforcing strips and adhesive coatings lie between cardboard sheet material.

FIG. 2 shows how the edge flap **14** has been joined to the edge of side panel **13**, as by stitcher staples **23**. This is usually referred to as the manufacturer's joint since it can be conveniently made in a box-making plant, the cartons then being shipped in the flat folded condition with the end flaps extended.

FIG. 2 shows the disposition of the top end flaps before folding, it being assumed that the bottom end flaps have been folded and sealed.

FIG. 3 shows how the end flaps **16** and **18** with the adhesive coatings are folded down first, with the other end flaps **17**, **19** being folded down later and bonded to the lower flaps by the adhesive coatings.

Preferably the adhesive is heat-sealable, providing for easy sealing in final assembly by the application of heat. Some known types of dry-handling heat-sealable adhesive are plasticized cellulose acetate, polyvinyl acetate and alpha-chloroacrylonitrile, which latter polymerizes very rapidly at relatively low heat to form a bond.

The reinforcing strips are preferably of the type described in Patent No. 3,028,281, formed of a number of rayon tire-type cords held together in flat parallel band form by a vinyl resin heat-sealable composition. Such band strips have much greater tensile strength than the fiberboard sheet material forming the carton. Reinforcing strips of this material are especially suitable because they have great tensile strength for unit cross sectional area and also because they have an extensibility approximately equal to that of the fiberboard sheet material of which the cartons are formed whereby the strips will change length under stress equally with the carton material and therefore will not tend to break the bond to the sheets. Such strips can readily be applied to the blank sheets during the manufacture of the sheets, there being sufficient heat in the sheet making machinery to effect the sealing of the strips to the sheets. However, it is to be understood that the reinforcing strips may be secured to the sheets by glue or other suitable adhesive and that they can be of a material different from that dis-

closed in the above-mentioned patent so long as they are sufficiently strong and have sufficient flexibility where they cross the sheet fold lines.

FIG. 4 shows an embodiment which in general is much like the embodiment of FIGS. 1–3 but in which the end flaps **16.1** and **18.1**, instead of being of a length to meet in the mid-width of the carton, are each of sufficient length to extend fully across the width of the carton. Flap **16.1** is folded down first; then the flaps **17.1** and **19.1** with the reinforcing strips **21.1** are folded down over the flap **16.1** and bonded thereto at this or a final stage if desired; then the flap **18.7** is brought down over the flaps **17.1** and **19.1** with adhesive **22.1** on the single flap **18.1** covering the entire area or in stripes, as shown for convenience of illustration; and finally the end closure flaps are sealed together, if not glued as they are folded down.

The parts of FIG. 4 are in other respects like the corresponding parts of the first form and the same reference characters, with ".1" added, are used for them. They need not be specifically described further.

FIG. 5 shows another embodiment which is somewhat like the FIG. 4 embodiment but in which there is but one long top flap **18.2** carrying reinforcing strips **21.2** and adhesive coating **22.2** and in which the other half-width flaps **17.2**, **19.2** carry reinforcing strips **21.2**, the adhesive here being shown as stripes located in proper position to overlie the reinforcing strips **21.2** of the flaps **17.2** and **19.2** when they are later folded down. The flap **18.2** is provided with a tab **18.2***a*, bendable at a weakened fold line which engages over an adhesive coating **22.2***a* on the side **10.2** to seal the carton and form a gap connection for the band formed by the reinforcing strips. The other parts correspond to the parts of the other embodiments and are designated by the same reference character with ".2" added. They need not be specifically described.

The ends of the reinforcing strips **21.2** on the tab **18.2***a* do not lie in a common plane with the ends of the reinforcing strips at the upper edge of the side panel **10.2** but the bond of the joint connection is carried in shear through the thickness of the fiberboard material and the band connection strength will be entirely adequate.

FIG. 6 shows an embodiment in which the side panels **10.3**, **11.3**, **12.3** and **13.3** carry vertical reinforcing strips **21.3** and in which the connection between strip ends is made by strong end caps **24** which are adhesively bonded to the end edges of the side panels. In this case there are no end flaps, the end caps taking their place and being sufficiently strong by reason of their material and shape to complete the band effect of the reinforcing strips.

It is thus seen that the invention provides an improved reinforced carton, an improved blank therefor, and an improved method of forming the reinforced carton.

While certain embodiments of the invention have been shown for purposes of illustration, it will be understood that there may be other embodiments within the general scope of the invention.

I claim:

1. In a carton, in combination, four side panels forming a complete circumferential enclosure, and an end closure flap hingedly connected to at least one of said side panels, the side panel carrying said flap and the opposite side panel having a reinforcing strip, of material which is considerably stronger in tension than the material forming the side panels and end flap, secured thereto, said reinforcing strip extending across said flap, and means forming a tension load-carrying connection through the flap and strip between said opposite side panels.

2. In a carton, in combination, four side panels forming a complete circumferential enclosure, and end closure means including at least one end closure flap hingedly connected to one of said side panels, the side panels and end closure means having a first face and a second face, a reinforcing strip, of material which is considerably stronger in tension than the material forming the side panels and flap, secured to a first face of said side panels and end flap, and an adhesive securing a first face to a second face to secure the end closure means over an end of the enclosure formed by the side panels.

3. In a carton, in combination, four side panels forming a complete circumferential enclosure, end closure means forming with said side panels a complete space enclosure, a reinforcing strip, of material which is stronger in tension than said side panels and end closure means, secured to one face of opposite side panels and end closure means to form a complete band for the carton except at adjacent ends of the reinforcing strip, and means forming a tension load-bearing connection between the adjacent ends of the reinforcing strip.

4. In a carton, in combination, four side panels forming a complete circumferential enclosure, end closure means forming with said side panels a complete space enclosure, a reinforcing strip, of material which is stronger in tension than said side panels and end closure means, secured to one face of opposite side panels and end closure means to form a complete band for the carton except at adjacent ends of the reinforcing strip, and means forming a tension load-bearing connection between the adjacent ends of the reinforcing strip, the adjacent ends of the reinforcing band lying in a common plane, and said tension load-bearing connection including a part of said end closure means adhesively bonded to an adjacent part.

5. In a carton, a blank comprising a flat sheet of material having weakened hinge lines defining four side panels and end closure flaps for at least one of said side panels, and a reinforcing strip, of material which is stronger in tension than the material of said sheet, secured to one face of the sheet across a panel and the flaps at the ends thereof and across an assembly-opposed panel between distant edges which are later connected, whereby to form a tension band for the carton when it is assembled with a tension load-bearing connection across the said edges, the blank having an adhesive coating on the other face thereof to form a connection between the edges when the carton is assembled.

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