July 20, 1943. R. M. BOTLEY 2,324,757

CARTON, CARTON BLANKS, AND METHOD OF MAKING THE SAME

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Fig. 1

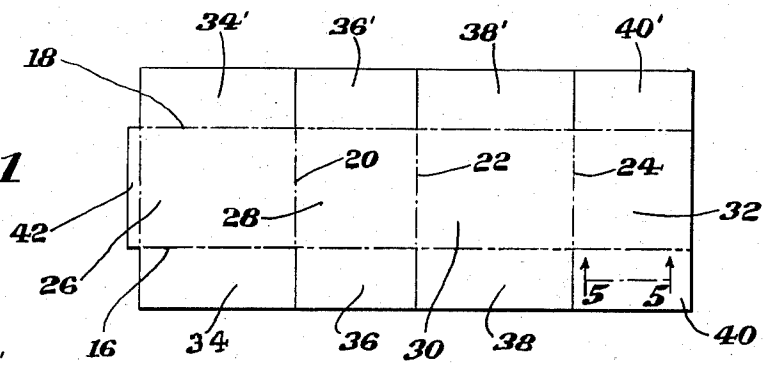


Fig. 3



Fig. 2

Fig. 4

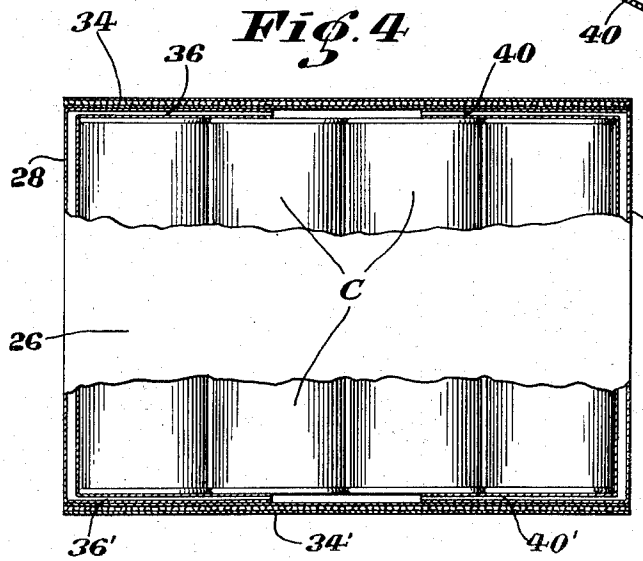


Fig. 5

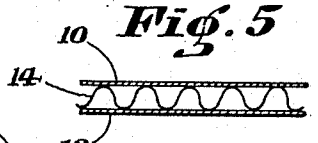
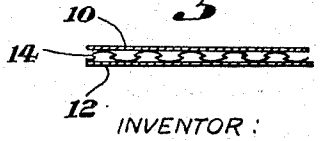


Fig. 6



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Fig. 7

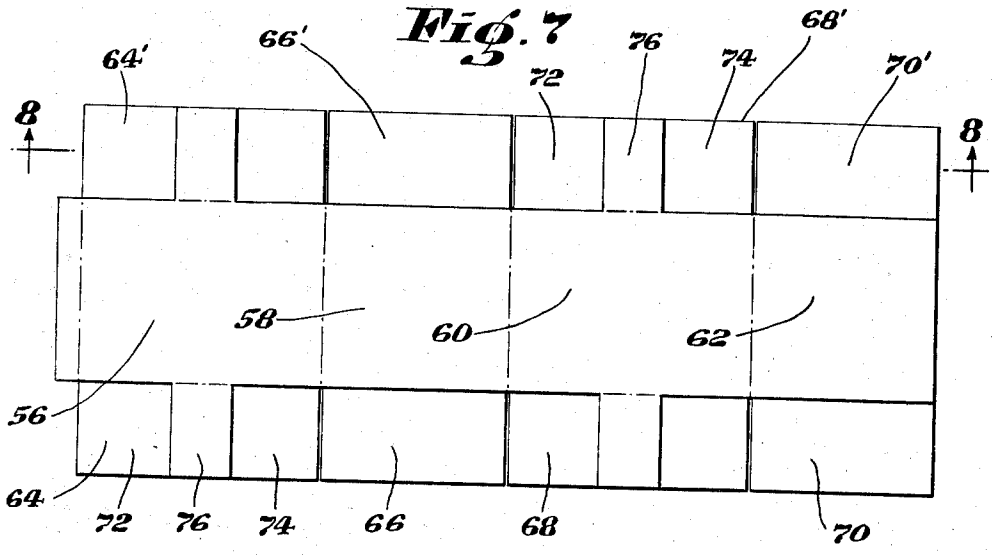


Fig. 8

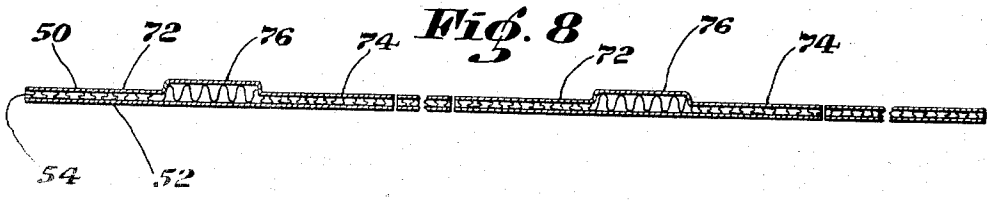
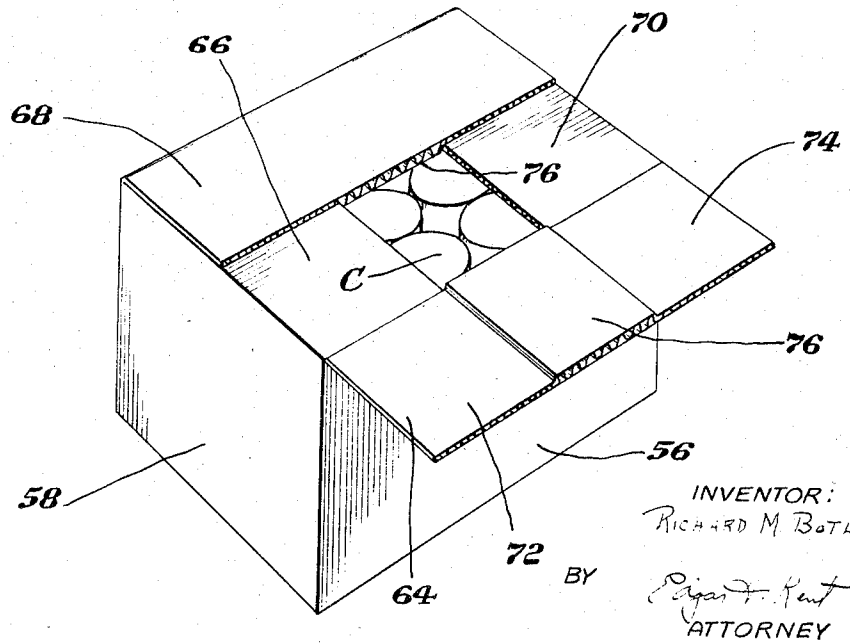


Fig. 9



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CARTON, CARTON BLANK, AND METHOD OF MAKING THE SAME

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Application June 3, 1941, Serial No. 396,429

7 Claims. (Cl. 229—37)

This invention relates to cardboard or fibreboard cartons for packaging canned goods and other articles of a heavy nature, more particularly to such cartons which include within their wall structure a layer or layers of corrugated paper or cardboard, to blanks adapted for folding to form such cartons, and to methods of making the same.

In packaging canned goods, bottled goods, and the like, it is usual to employ packing cartons in which the wall structure includes corrugated paper or cardboard, generally as an intermediate ply adhesively secured between face plies of smooth paper or cardboard. Ordinarily such cartons are formed from a single blank of material comprising smooth facing plies and an intermediate corrugated ply, the blank being adapted for folding to form a carton having continuous side and end walls, and flaps projecting inwardly from the top and bottom edges of the side and end walls, which flaps are adapted to be secured together in overlapped relation to form the top and bottom walls of the carton.

As a general rule, such cartons are dimensioned more or less exactly to fit the contents, that is, the relative lengths of the side and end walls are so proportioned that the contents fit snugly therebetween, and the height of these walls is such that the inner flaps at top and bottom of the carton rest tightly upon the top and bottom surfaces of the contents, and are locked in that position by the outer flaps folded thereover and adhesively secured thereto. Thus, as initially packed and sealed, the cartons are adapted to prevent any significant shifting movements of the contents relative to the container walls.

Serious difficulty has been encountered, however, due to a tendency of heavy contents, such as canned goods, to compress, indent and break down the corrugated ply of the bottom flaps therebeneath, thereby providing head space between the top of the carton and the contents which permits vertical shifting of the contained articles relative to the carton and to each other, resulting in damage to the articles. This difficulty is accentuated by the customary practice of stacking the cartons, after they have been packed, in superposed relation, with the bottom of one carton resting on the top of the next lower carton. The top and bottom wall forming flaps of the lower cartons in any stack are thus subjected to the heavy pressure of the weight of the packed cartons above them which tends to compress and break down the corrugated ply of the top and bottom flaps to a substantial degree and provide further damaging looseness and play for the contents during subsequent handling and shipment.

An object of this invention is to provide a novel, improved carton construction of the type referred to, and method for making the same whereby formation of undesirable head space between the top and bottom walls of the carton and the contents, after packing and sealing of the carton, is substantially completely avoided. A further object is to provide a novel blank construction adapted for use in the manufacture of such a carton. Other objects and advantages of the invention will be apparent from the ensuing more particular description and from the accompanying drawings wherein:

Fig. 1 is a plan view of a carton forming blank of conventional construction, adapted for treatment in accordance with the invention to alter its structure;

Fig. 2 is a perspective view of the blank of Fig. 1 having its structure altered in accordance with the invention;

Fig. 3 is a section on the line 3—3 of Fig. 2;

Fig. 4 is a side view of a packed carton produced from the blank shown in Figs. 2 and 3, with parts broken away at top and bottom to show construction.

Fig. 5 is a fragmentary section view on the line 5—5 of Fig. 1;

Fig. 6 is a fragmentary section view on the line 6—6 of Fig. 2;

Fig. 7 is a plan view of a modified form of carton blank of the invention;

Fig. 8 is a broken section view on the line 8—8 of Fig. 7;

Fig. 9 is a perspective view of a packed carton formed from the blank shown in Figs. 7 and 8, with one side flap open.

Referring now to the embodiment illustrated in Figs. 1–6 of the drawings, the carton forming blank shown in Fig. 1 was, in conventional manner, cut from a single sheet of material which comprised, as is shown in Fig. 5, face plies 10 and 12 of smooth cardboard or fibreboard adhesively secured to the opposite surfaces of an intermediate ply 14 corrugated throughout in the manner illustrated in Fig. 5. As shown in Fig. 1, the blank is creased longitudinally at 16 and 18, and the intermediate portion of the blank between the crease lines 16 and 18, is creased laterally at 20, 22 and 24, forming said intermediate blank portion into relatively foldable sections 26, 28, 30 and 32. The marginal portions of the blank defined by the crease lines 16 and 18 are severed

inwardly opposite the ends of the crease lines 20, 22 and 24 to subdivide said portions respectively into separate sections 34, 36, 38, 40 and 34', 36', 38', 40'. As is conventional, the blank is adapted to be folded upon the lines 20—24 to generally rectangular shape, and to be secured together at its opposite ends by wire-stitching a tab 42, projecting from the outer end of section 26, to the opposite end portion of section 32, thus forming the sections 26 and 30 into the opposite side walls, and the sections 28 and 32 into the opposite end walls, of the carton. The sections 36, 40 and 36', 40' form the opposite end flaps respectively at top and bottom of the carton, while the sections 34, 38 and 34', 38' form the opposite side flaps respectively at top and bottom of the carton, these flaps being adapted to fold inwardly along the crease lines 16 and 18, with the side flaps overlapping the end flaps, to form the top and bottom walls of the carton.

In accordance with the invention, the conventional blank of Fig. 1 is subjected, throughout the marginal portions outside the lines 16, 18 which form the carton flaps, but not in the intermediate portion which forms the carton walls, to heavy crushing pressure such as to permanently flatten down the corrugations in these portions in the manner generally indicated in Fig. 6 and to substantially reduce the thickness of these portions, compared to the intermediate wall portion, as indicated in Fig. 2. This flattening of the corrugations of the ply 14 throughout the flap forming portions 34—40 and 34'—40', while leaving the original corrugated structure of this ply unaffected in the wall forming portions 26—32, may be readily effected by laying the blank upon a planar surface and pressing the surface of the marginal flap forming portions of the blank with suitably shaped dies or pressure rollers, as will be readily understood.

The carton blank in the form shown in Fig. 2, with the flap portions crushed throughout as above explained is now folded to carton form in the manner previously described and is then ready for packing, as with the two superposed layers of canned goods indicated in Fig. 4. In packing the carton, the cans C, or other contents, will be inserted between the side and end walls of the carton, the end flaps at top and bottom of the carton will be folded inwardly onto the top and bottom surfaces, respectively, of the contents, adhesive will be applied to the inner surface of the top and bottom side flaps, or to the outer surface of the top and bottom end flaps, the side flaps will be folded inwardly into engagement with the outer surface of the end flaps, and the top and bottom of the carton will then be subjected to opposed pressure while the adhesive hardens uniting the outer face of the end flaps to the inner face of the side flaps, in usual manner.

Inasmuch as the width of the wall portions 26—32 of the carton blank is made to conform to the depth of the carton contents, as to the depth of the two layers of cans C constituting the contents in Fig. 4, the end flaps are substantially horizontally disposed with their inner faces in tight engagement with the top and bottom surfaces of the contents, as shown in Fig. 4, in which position they are firmly locked by the side flaps horizontally closed thereover and adhesively united thereto.

I have found that, by the pre-crushing of the flaps as above described, this initial tight fit between the contents and the top and bottom end flaps of the carton is made to endure, even with heavy contents such as canned goods, despite the rigors of storage and shipment which, in the case of the ordinary corrugated cardboard carton, result in the formation of considerable head space within the carton, thereby destroying the predetermined fit between the contents and the top and bottom walls of the carton and providing damaging looseness of the contents within the carton, as previously explained. That this precrushing of the flaps should produce this beneficial result is surprising in that the flattening down of the corrugated structure within the flaps tends to weaken to some extent the resistance of the individual flaps to bending or bulging under pressure. But the overlapping and bonding together of the oppositely extending crushed flaps to form the top and bottom walls provides sufficient strength to prevent any significant additional bulging or bending of these walls than would take place if the flaps were not crushed, whereas the crushing of the flaps before they are fitted and secured over the contents substantially completely eliminates the possibility for subsequent indenting or crushing of the structure of these walls which, in the usual corrugated fibreboard carton, is the cause of undesirable looseness.

In the blank shown in Fig. 1, the width of the flaps, i. e., their lateral extent beyond the lines 16, 18, is uniform and is substantially equal to one-half the distance between the side walls 26 and 30 of the formed carton, as is customary. The side flaps are therefore adapted to substantially abut at their inner edges when folded over the end flaps in the formed carton, but where, as shown, the formed carton is of greater length than width, the end flaps will be separated at their inner edges when folded to carton closing position. Consequently, when the blank of Fig. 1 is folded to carton form, packed and sealed as previously described, an irregular joint is formed between the inner edges of the end flaps and the surface of the side flaps therebetween, providing a non-level inner surface for the top and bottom walls of the carton, as shown in Fig. 4.

In case the carton is to be of greater length than width and such irregularity in the inner top and bottom surfaces of the carton would be detrimental, the blank construction shown in Figs. 1 and 2 may, of course, be modified by making the end flaps wider than the side flaps by substantially half the increased length over width of the carton so that they, also, will abut at their inner edges when folded to carton closing position, forming a level inner surface at top and bottom of the carton. But this would increase the cost of the blanks substantially, not only by the cost of the material added to the end flaps but also by the cost of additional blank forming material which is necessarily wasted in cutting a blank with irregular sides. Therefore, in such case, I prefer to employ the modified construction shown in Figs. 7–9 of the drawings by which I am enabled to provide a carton construction possessing advantages of the carton construction shown in Fig. 4 and, at the same time, the further advantage of a level joint between the inner edges of unmeeting inner flaps and the inner surface of the side flaps lying between them, at no additional cost whatever.

In providing the modified blank and carton of the invention, shown in Figs. 7–9, I may utilize a cut blank identical in shape and construction to that shown in Fig. 1, having smooth face plies

50 and 52 and an intermediate ply 54 corrugated throughout the blank in the same manner as the ply 14 of the blank of Figs. 1 and 5. The blank of Fig. 7 is subdivided by longitudinal and transverse fold lines and by transverse incisions, in identical manner to the blank of Fig. 1, into portions forming the side walls 56, 60, the end walls 58, 62, top and bottom side flaps 64, 68, 64', 68' and top and bottom end flaps 66, 70, 66', 70' of the carton. As before, the side walls are longer than the end walls so that the carton formed from the blank is rectangular and the end flaps do not meet at their inner edges.

As in the case of Fig. 2, the blank of Figs. 7 and 8 has been subjected to compression treatment to flatten down corrugations of the intermediate corrugated ply 54 in the marginal areas of the blank constituting the flaps of the carton, while leaving the intermediate portion of the blank constituting the side and end walls of the carton uncompressed. But while the end flaps 66, 70, 66', 70' are compressed in this manner throughout their area as in the blank of Fig. 2, the side flaps 64, 68, 64', 68' are each so compressed only in portions 72, 74 at opposite ends of the flaps, leaving an intermediate portion 76 uncompressed, or relatively so, as shown. The compressed portions 72, 74 at the ends of each of the side flaps are at least, and preferably substantially exactly, coextensive in area with the area of the opposite end flaps which is overlapped by said side flap when the flaps are folded to carton closing position.

This flattening of the corrugations within the blank of Figs. 7 and 8 may be accomplished in similar manner to that described with reference to Fig. 2, for example by laying the blank upon a flat surface and pressing the surface of the end flaps and of the areas 72, 74 of the side flaps with suitably shaped dies or pressure rollers. It will thus be seen that the blank of Figs. 7 and 8 can be prepared as easily as the blank of Fig. 2 and at no increased cost.

The blank shown in Figs. 7 and 8 is adapted to be folded to carton form, in the manner previously described with reference to the embodiment of Fig. 2, with the portions 76 on the inside of the respective side flaps. The carton may then be packed and the flaps closed and sealed, with the end flaps resting upon the contents and with the side flaps sealed thereover, in the manner previously described. Since the compressed areas 72, 74 of each side flap are at least coextensive in area with the portions of the end flaps which they overlap, the intermediate portion 76 will be disposed in the space between the overlapped end flaps when the carton is sealed, as shown in Fig. 9. When, as is preferred and as is shown in Figs. 7–9, the areas 72, 74 of each side flap are made substantially exactly coextensive in area with the overlapped portions of the end flaps, the side edges of the portions 76 will closely abut the inner edges of the adjacent end flaps, forming therebetween a butt joint as indicated in Fig. 9.

The depth of compression of the areas 72, 74 relative to the portion 76 is so regulated as to be substantially equal to the thickness of the compressed end flaps. In the embodiment illustrated in Figs. 7–9, this is accomplished by compressing the end flaps and areas 72, 74 to substantially half their original thickness and leaving the portions 76 substantially uncompressed. It will therefore be seen that the uncompressed, or relatively uncompressed, portions 76 of the side flaps enable the formation of a substantially level joint between the inner surface of the end flaps and the inner surface of the side flaps between the end flaps. At the same time, the carton of Fig. 9 possesses the advantages in prevention of head space formation that are provided by the carton of Fig. 4.

While I prefer to effect the compressing of the flaps in the blank prior to folding to carton form, as shown and described, this is not essential, and the compressing of the flaps may take place in the formed carton before or after packing, so long as it takes place prior to the sealing of the flaps. Compression of the corrugated material in the carton blank may take place before creasing of the cut blank, or even before or coincident with the cutting out of the blank, rather than after creasing of the cut blank as above described. The material employed for making the cartons may include more than one corrugated ply and more or less than two facing plies. These and other permissive modifications and adaptations within the scope of the invention will readily occur to those skilled in the art.

Having described and illustrated preferred embodiments of the invention, what I desire to claim and secure by Letters Patent is:

1. A carton for packaging articles which includes side and end walls, pairs of opposed inner flaps connected to the top and bottom edges of an opposite pair of said walls and adapted to fold inwardly thereof, and oppositely extending outer flaps connected to said walls and adapted to be folded inwardly thereof to rest upon the outer surface of the top and bottom pairs of inner flaps, respectively, and to be sealed thereto to form the top and bottom walls of the carton, said side and end walls and said flaps being each formed of a multi-ply, fibrous, sheet material which includes at least one corrugated ply, said corrugated ply, in said flaps only and prior to sealing of said flaps, throughout said inner flaps and throughout at least the areas of said outer flaps which overlie said inner flaps when the flaps are folded over and sealed together in operative position, having its individual corrugations thoroughly flattened and crushed down to an extent sufficient to reduce the thickness of said crushed flap portions to not more than substantially one-half the thickness of the sheet material uncrushed.

2. A carton for packaging articles which includes side and end walls, a pair of opposed inner flaps connected to said end walls and adapted for folding inwardly thereof to a plane substantially normal to said walls without meeting at their inner ends, and an outer flap connected to one of said side walls and adapted to be folded inwardly thereof and to be sealed to the outer surface of said inner flaps disposed in said plane, said carton being formed of a multi-ply, fibrous sheet material which includes at least one corrugated ply, said corrugated ply, prior to sealing of said flaps, throughout said inner flaps and throughout those areas only of said outer flap which overlie said inner flaps when the flaps are folded over and sealed together in operative position, having its individual corrugations thoroughly flattened and crushed down to an extent sufficient to reduce the thickness of said crushed flap portions to not more than substantially half the thickness of the sheet material uncrushed, the corrugations of said ply, in the intermediate portion of said outer flap and in said side and

end walls being uncrushed, said uncrushed intermediate portion of said outer flap being thereby raised above the inner surface of the crushed areas of said flap and being adapted to enter and substantially fill the underlying gap between the unmeeting ends of said inner flaps when the flaps are folded over and sealed in operative position.

3. A carton for packaging articles which includes side and end walls, pairs of opposed inner flaps connected to the top and bottom edges of an opposite pair of said walls and adapted to be folded inwardly to a plane substantially normal to said walls without meeting at their inner ends, and pairs of opposed outer flaps connected to the top and bottom edges of the other pair of said walls and adapted to be folded inwardly to rest upon the outer surface of said top and bottom pairs of inner flaps, respectively, and to be sealed thereto to form the top and bottom walls of the carton, said carton being formed of a multi-ply, fibrous sheet material which includes at least one corrugated ply, said corrugated ply, in said flaps only and prior to sealing of said flaps, throughout said inner flaps and throughout those areas only of said outer flaps which overlie said inner flaps when the flaps are folded over and sealed in operative position, having its individual corrugations thoroughly flattened and crushed down to an extent sufficient to reduce the thickness of said crushed flap portions to not more than substantially half the thickness of said sheet material uncrushed, whereby the uncrushed intermediate portions of said outer flaps are raised above the inner surface of the crushed portions of said flaps and are adapted to enter and substantially fill the gaps between the unmeeting ends of said inner flaps when the flaps are folded over and sealed in operative position.

4. A carton blank comprising a generally rectangular sheet having smooth surface plies and at least one intermediate spacing ply of corrugated fibrous material, said blank adapted for folding to form portions thereof into upstanding side and end walls of the carton and other portions into inner flaps and oppositely extending outer flaps adapted for folding and for sealing together to form the top and bottom walls of the carton, said corrugated ply, in said flap-forming portions only of said blank, having its individual corrugations thoroughly flattened and crushed down, to an extent sufficient to reduce the thickness of said crushed flap-forming portions to not more than substantially half the thickness of the sheet uncrushed, throughout said inner flap-forming portions and throughout at least those areas of said outer flap-forming portions that overlie said inner flaps when the flaps are folded over and sealed together in operative position.

5. A carton blank comprising a generally rectangular sheet having smooth surface plies and at least one intermediate spacing ply of corrugated fibrous material, said blank adapted for folding to form portions thereof into upstanding side and end walls of the carton and other portions into inner flaps and oppositely extending outer flaps adapted for folding and for sealing together to form the top and bottom walls of the carton, said inner flaps being spaced apart at their ends when so folded and sealed to said outer flaps, said corrugated ply, throughout the inner flap-forming portions of the blank and throughout those areas only of said outer flap-forming portions of the blank which overlie the inner flaps when the flaps are folded over and sealed together in operative position, having its individual corrugations thoroughly flattened and crushed down to an extent sufficient to reduce the thickness of said crushed flap portions to not more than substantially half the thickness of said sheet uncrushed, the corrugations of said ply, in the intermediate area of said outer flap-forming portions and in said side and end wall forming portions of said blank being uncrushed, said uncrushed intermediate areas of said outer flap-forming portions being thereby raised above the inner surface of the crushed areas of said portions and being adapted to enter and substantially fill the gaps between the unmeeting ends of the inner flaps when the flaps are folded over and sealed in operative position.

6. In a method of packaging articles in a carton having upstanding side and end walls and inner and outer flaps on the top and bottom edges of said walls, the structure of said flaps comprising multi-ply fibrous sheet material which includes at least one corrugated ply, wherein said outer flaps are folded over and secured upon the outer surface of said inner flaps to seal the articles within the carton fitting tightly between the inner surfaces of said inner flaps, the step which comprises subjecting the material of said flaps only, prior to the sealing of said flaps, to compressive force exerted simultaneously on opposite surfaces of said material to an extent sufficient to thoroughly flatten and crush down the individual corrugations of said corrugated ply of said material throughout said inner flaps and throughout at least the areas of said outer flaps which overlie said inner flaps when the flaps are sealed together so that said flaps, in said crushed portions, have a thickness of not more than substantially half the thickness of the sheet material uncrushed.

7. In a method of making a carton having side and end walls, top and bottom pairs of inner cover flaps spaced apart at their ends when closed to form gaps and top and bottom pairs of oppositely extending, overlapping outer cover flaps adapted to be folded and sealed over said inner flaps, said carton being formed of a multi-ply, fibrous material which includes at least one corrugated ply, the steps performed prior to sealing said flaps which comprise thoroughly flattening and crushing down the individual corrugations of said ply throughout said inner flaps by compressing said flaps to an extent sufficient to reduce their thickness at least approximately fifty per cent, and thoroughly flattening and crushing down the individual corrugations of said ply in the areas only of said outer flaps which overlie said inner flaps when the flaps are folded over and sealed in operative position by pressing the inner surface of said areas toward their outer surface to an extent sufficient to reduce the thickness of these areas at least approximately fifty per cent, while leaving the corrugations of said ply in said side and end walls and in the intermediate areas of said outer flaps which overlie the gaps between said inner flaps relatively uncompressed and upstanding, whereby said intermediate areas of said outer flaps are raised above the inner surface of the crushed portions of said outer flaps and are adapted to enter and substantially fill the gaps between said compressed inner flaps when said flaps are folded and sealed together in operative position.

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