

May 12, 1970

S. M. SILVER
SIFTPROOF CARTONS

3,511,431

Filed Jan. 4, 1968

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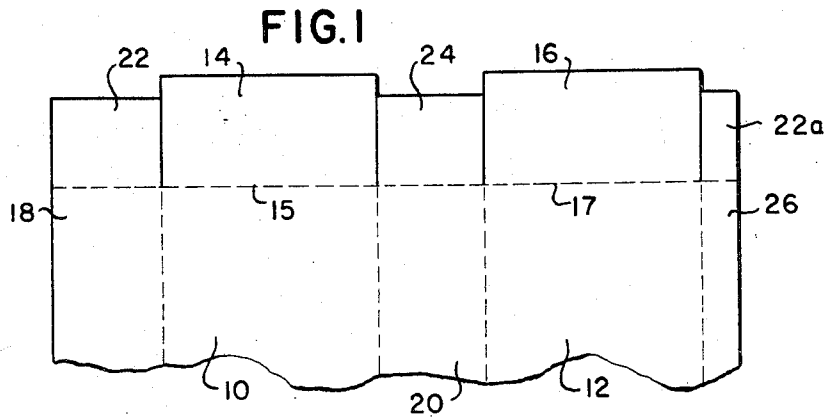
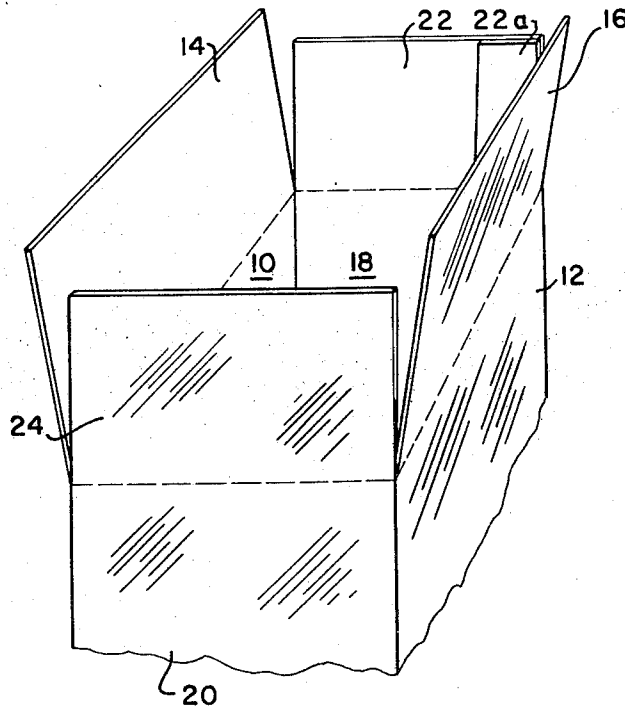


FIG. 2



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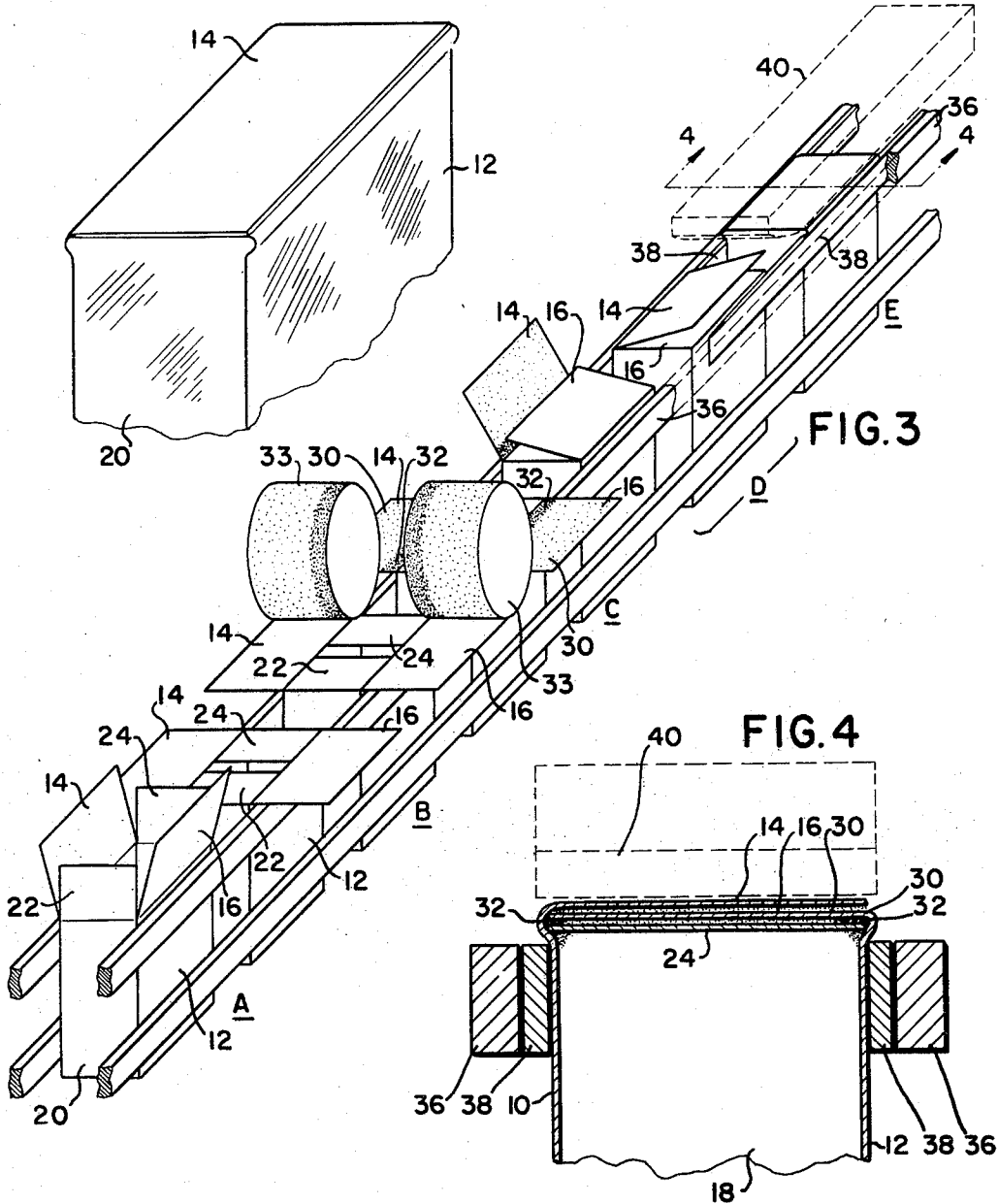
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FIG. 5



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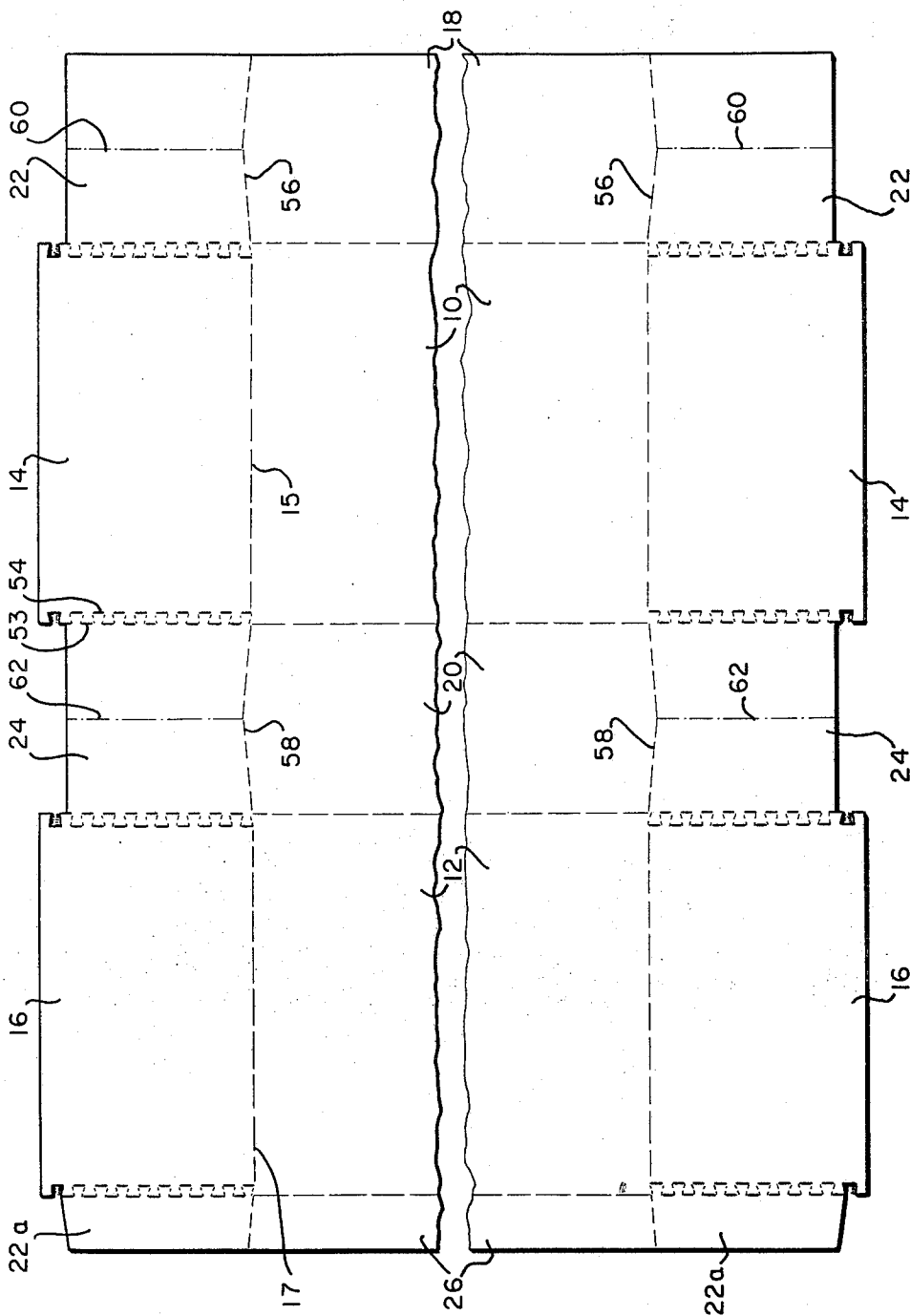
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FIG. 6



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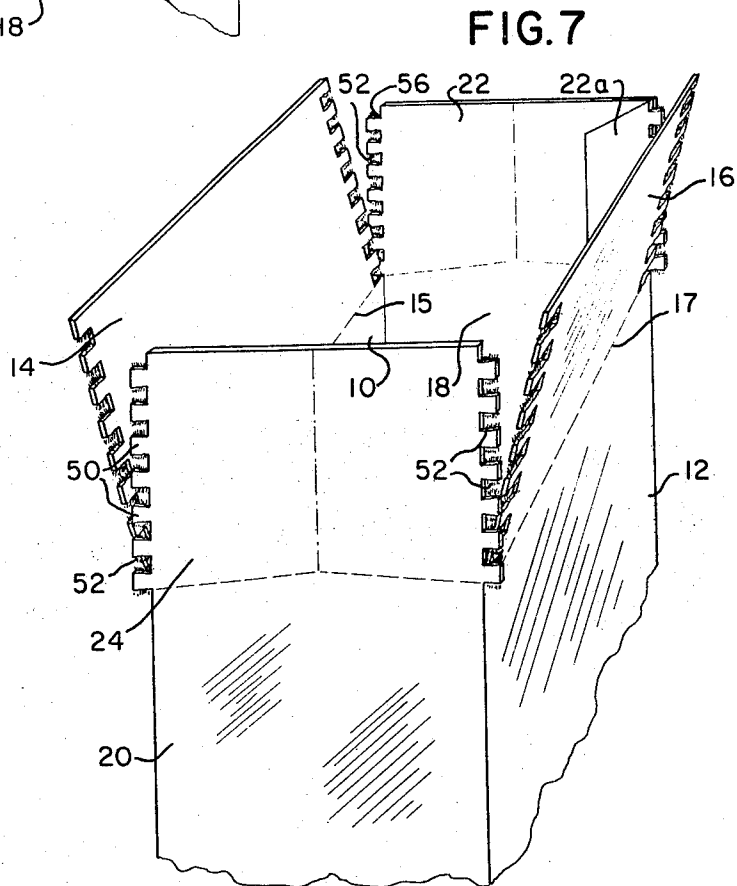
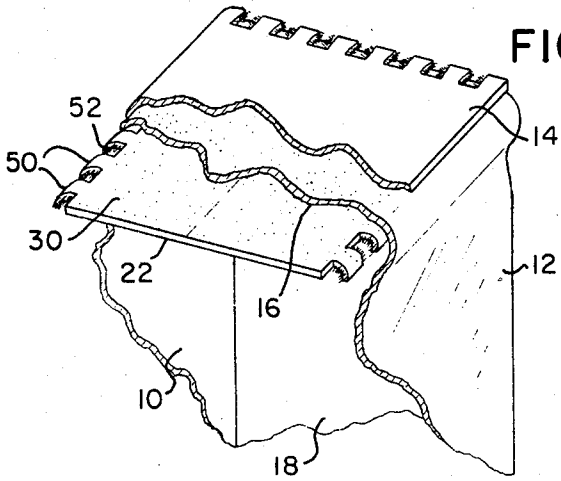
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FIG. 9

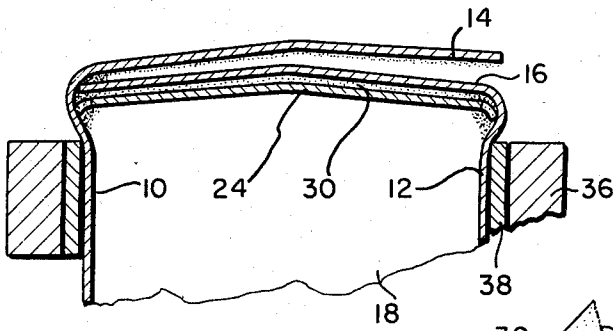


FIG. 8

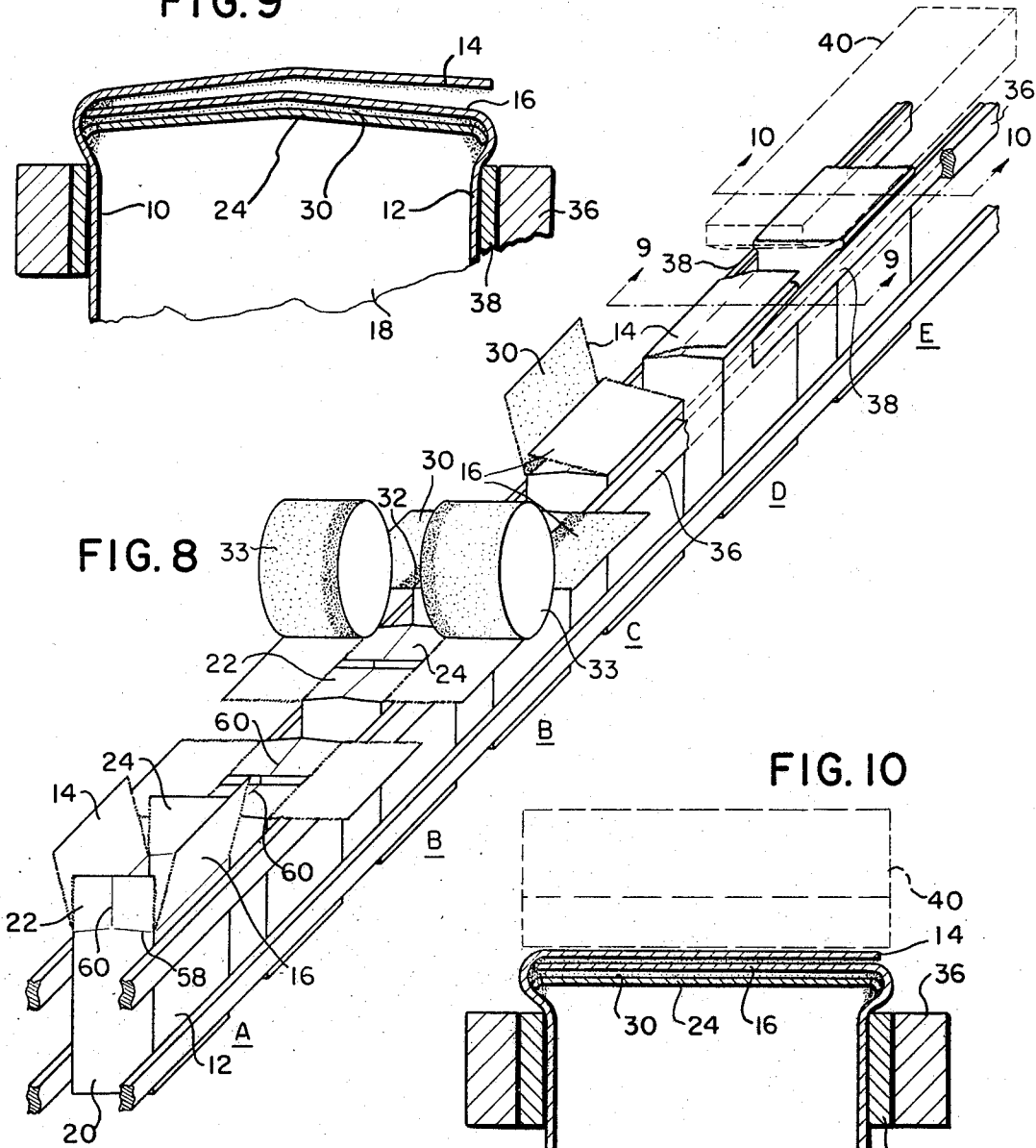
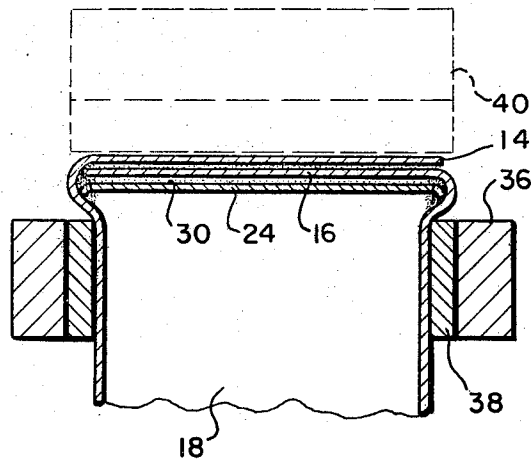


FIG. 10



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3,511,431

SIFTPROOF CARTONS

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Continuation-in-part of applications Ser. No. 607,216,
and Ser. No. 611,211, both filed Jan. 4, 1967. This applica-
tion Jan. 4, 1968, Ser. No. 695,786

Int. Cl. B65d 5/02

U.S. Cl. 229—37

17 Claims

ABSTRACT OF THE DISCLOSURE

A one-piece carton of rectangular cross section having at least one siftproof sealed end. The seal is formed by dust flaps and closure flaps with the dust flaps adhered along their entire surface to a closure flap and having at least a portion of their side edges adhesively secured to the closure flap-supporting walls; said adhesive securing attained by slight excess width of the dust flaps; the excess width being preferably softened and serrated; and by crimping the closure flap-supporting walls toward one another immediately below the dust flap side edges, forming beaded carton edges enclosing the edges of the dust flaps.

This application is a continuation-in-part of my inventions described and claimed in my copending applications Ser. No. 607,216, filed Jan. 4, 1967, for a Method of Forming Cartons, and Ser. No. 611,211, now Pat. No. 3,394,866, dated July 30, 1968, filed Jan. 4, 1967, for a Blank for Sift-proofing Cartons and Method of Making the Same.

The present invention relates to tubular, end-sealed cartons and, more particularly, to single-thickness cardboard cartons that are substantially hermetically sealed against communication between their interior and the exterior against loss or spoilage of their contents either by the sifting thereof or by the intrusion thereto of any material from the exterior that is deleterious thereto.

The present invention is directed to the provision of a carton which will eliminate leakage therefrom or thereinto, due to imperfect sealing of its end, particularly on the end from which it has been filled. Such imperfect sealing may result from incomplete adhesion between the dust flaps and cover flaps due to the tendency of the glue-wetted dust flaps to curl away from the cover flaps, which also interferes with the adhesion of the side edges of the dust flaps with the walls of the carton adjacent thereto. It may also result from pinholes at the corners of the sealed carton end which frequently occur due to the fact that the folding of the panel walls along the fold lines is not always true and does not always produce an accurate parallelepiped, so that the walls are not of equal width throughout their height and the side edges of the dust flaps are, therefore, not parallel to or in contact with at least one of the walls adjacent thereto when such flaps are infolded for sealing.

It is an object of the present invention to provide cartons, of the character described, that are substantially completely sealed against sifting at the corners of the end seal and between the dust flaps and the cover flaps and the side edges of the dust flaps and the carton walls adjacent such side edges.

It is another object of the present invention to provide siftproof cartons, of the character described, which require no excess cardboard in their formation and may, therefore, be produced at no advance in cost over standard, similar cartons heretofore in use.

It is a further object of the present invention to provide siftproof cartons, of the character described, which

may be set up, filled and sealed with standard equipment, only slightly modified, and at standard rates of speed.

The foregoing and other objects and advantages of the siftproof carton of the present invention will become more readily apparent to those skilled in the art from the embodiments of the invention more or less schematically illustrated in the accompanying drawings, and from the description following. It is to be understood, however, that such embodiments are shown by way of illustration only, to make the principles and practice of the invention more readily comprehensible and without any intent of limiting the invention to the specific details therein shown.

In the drawings:

FIG. 1 is a fragmentary, plan view of one form of a conventional carton blank for a carton of the present invention;

FIG. 2 is an isometric view of the blank of FIG. 1, on an enlarged scale, folded and glued and ready for sealing;

FIG. 3 is a more or less schematic, isometric view showing the set-up carton of FIG. 2, as passing through a constant, straight-line motion, carton-sealing apparatus;

FIG. 4 is a more or less diagrammatic section taken on line 4—4 of FIG. 3;

FIG. 5 is an isometric view of the sealed end of the carton coming off the apparatus of FIG. 3;

FIG. 6 is a foreshortened, top plan view of another, preferred, form of a blank for a siftproof carton of the present invention;

FIG. 7 is an isometric view of the folded and glued blank of FIG. 6, set up in readiness for sealing with the dust flaps and cover flaps severed from one another and ready for folding and sealing;

FIG. 8 is a more or less diagrammatic view illustrating the folding and sealing of an end of a carton made from the blank of FIG. 6 on apparatus similar to that of FIG. 3;

FIG. 9 is a section taken on line 9—9 of FIG. 8; and FIG. 10 is a section taken on line 10—10 of FIG. 8.

FIG. 11 is an isometric view, partly in section, of the sealed end carton of FIG. 7.

Generally stated, the formation of a siftproof carton seal may be effected by assuring that the dust flaps are directly in contact, along their top surfaces, with the overlying cover flaps and that their edges are in contact along their entire lengths with the walls of the carton adjacent thereto, especially at the corners, so that the adhesive will positively connect such surfaces and such edges with the adjacent carton portions. Such contact and adhesion may be effected in a number of ways. One way is by the provision of an excess amount of adhesion along the marginal side edge portion of the dust flaps that will, when the cover flaps are pressed against them, be compressed into any gaps or holes left when the dust flaps are inwardly folded to fill such gaps or holes.

A more effective seal may be attained by also, at the time of folding the dust flaps on the cover flaps, compressing inwardly the marginal edge portions of the walls adjacent the side edges of the dust flaps to press such wall portions against such side edges and to more positively contact the excess of the glue that is pressed from the upper surface when the cover flaps are pressed against such surface. Such compression will also inhibit the inward curling of the glue-wetted dust flaps and their continued contact with the cover flaps. Such compression will also leave a rib-like formation or chine on the end edges of such adjacent walls.

Still more effective siftproofing may be attained by slightly widening each dust flap at each side edge thereof

and the breaking up and softening of the fibrous structure of the excess width portions, to render them compressible and to fill any gap that may be present and directly contact the adjacent side walls and become compressed and directly glued thereto. The effects of this construction may likewise be enhanced by the inward compression of the end edge portions of the side walls adjacent to the dust flaps in the direction of the side edges of the dust flaps.

In the last embodiment, the excess width of the dust flap, instead of being continuous, may be interrupted by regularly-spaced recesses to provide a serrated tooth-like formation. The recesses will receive a quantity of the sealing adhesive which, when the excess width is compressed, will be pressed out from the recesses to ensure the complete adhesion of the edges of the dust flaps to the adjacent side walls of the carton, as well as to the edges of the overlying closure flaps, to produce a substantially hermetic seal at that end of the carton.

Referring now in detail to the accompanying drawings and with particular reference to FIGS. 1 to 5, inclusive, thereof, the same show a carton blank of conventional type cut and scored to have front and rear wall panels, 10 and 12, respectively, each formed with an end wall-forming flap at each of its ends (only one end shown), designated as 14 and 16, respectively, and defined from panels 10 and 12 by fold lines 15 and 17, respectively; and the end wall panels, 18 and 20, each formed with an inner dust flap, 22 and 24, respectively, at each of its ends (only one end shown). A terminal panel of the blank, such as rear wall panel 12, is provided with a glue flap, 26, along its free edge. Dust flaps 22 and 24 are preferably of a height not greater than half the width of a panel 10 and 12, and closure flaps 14 and 16 are preferably of a length greater than half the width of an end wall 18 and 20. Where the glue flap 26 of the blank is formed along the edge of a front or rear wall panel 10 or 12, as illustrated, its extension at each end, 22a, becomes part of the dust flap at the other edge of the blank, as 22, when the blank is folded and glued, as shown in FIG. 2.

The folded and glued blank, set up in tubular form (FIG. 2), may be moved for end sealing, in upright position, on a constant motion, straight line, end sealing apparatus of generally conventional type (FIG. 3), between guide rails 36, of the apparatus, with the front and rear walls 10 and 12 disposed against the guide rails, as indicated by the arrow.

As conventional, the erected carton, in its initial position in the apparatus, has its flaps upwardly extending, as shown at position "A." The carton is then moved to position "B," where dust flaps 22 and 24 are folded to horizontal position, over the carton opening, and end-wall closure flaps 14 and 16 are laterally outwardly offset, to overlie the rails 36. The carton is then moved to position "C," in the course of which movement an adhesive layer, 30, is applied to a selected pair of flaps for adhering one of the end wall forming flaps, as 14, to the dust flaps 22 and 24 and the other end wall closure flaps, 16, to flap 14.

The adhesive 30 may comprise a glue or a thermoplastic material. It may be applied to the upwardly facing surfaces of the outwardly offset end closure flaps 14 and 16 as illustrated, or to the upwardly facing surface of the inwardly offset dust flaps 22 and 24 and to the surface of end closure flap 16; both practices being conventional. When the adhesive 30 is applied to the selected flaps, a thickened band of adhesive is applied to their marginal edge portions closest to walls 10 and 12, as indicated at 32; whether such adhesive is in liquid form, as glue, or in the form of a thermoplastic material, which may be melted by the application of heat at the appropriate position on the end sealing apparatus, by conventional heated knives.

The thickened band of adhesive 32, when in glue form, may be applied in any one of a number of ways, as by suitably notching the wiping or doctor blade of the gluer (not shown) so as to leave a thicker layer of adhesive on the appropriate edge of each of the gluing drums, 33, or by the use of a second set of gluing drums in tandem with the drums 33. Preferably the band of thicker layer of adhesive may be so applied that it slightly overlaps the edges of those flaps to which it is applied. When adhesive or glue is applied to flaps 14 and 16, a narrow band of glue may at the same time be applied to the marginal portions of the side edges of dust flaps 22 and 24, to provide an excess of glue along these portions on the closing of the flaps 14 and 16.

Thereafter, the carton is moved toward position "D," in the course of which movement the flap 16 is plowed into horizontal position to overlie dust flaps 22 and 24 and the adhesive-coated closure flap 14 is then plowed to overlie closure flap 16. From this position, instead of having the flaps pressed against one another to form the carton seal, as is conventional, the present invention provides, at position "E," for the gradual compression or pinching of the front and rear panels 10 and 12 slightly towards one another, at a point immediately adjacent the fold lines 15 and 17, to inhibit the inner movement or curling of dust flaps 22 and 24. Such pinching may be accomplished by applying to the inner surfaces of the guide rails 36 of the apparatus, at that location, relatively thin shims forming pinch rails, 38, whose lead edges are tapered toward their supporting guide rails, to thereby gradually pinch the wall panels 10 and 12 toward one another and effect a compression without risk of damage to the carton walls. Substantially simultaneously with the pinching operation, pressure is applied, likewise progressively and gradually, to the outer closure flap 14, from the exterior, to press all of the flaps together to form the seal; the pressure being applied only slightly behind the application of the pinching pressure by the pinch rails 38. Such pressure application may be in any conventional manner, as by means of a pressure plate, 40, shown in the drawings in broken lines, for clarity of illustration, or by rollers. Preferably the degree of pinching is relatively slight, totaling approximately one-sixteenth of an inch ($\frac{1}{16}$ "), or $\frac{1}{32}$ -inch on each side.

It may here be stated that the shims 38 may be permanently coated with a plastic lubricant of the type that is frequently used on the guide rails themselves, to reduce the friction on the cartons moving between them.

The shims or pinching rails 38, in addition to preventing the inward curling of the inner dust flaps 22 and 24 which are glue-wetted, also serve to bring the upper edges of the front and rear walls 10 and 12 into contact with the line of thickened adhesive 32 which is pressed from between the adhesive-coated flaps under pressure of plate 40, at least at the points at or adjacent the corners of the carton, even when the flaps 22 and 24 are not entirely parallel to walls 10 and 12, to assure the filling in and sealing of such corners by a direct adhesion between the sides 10 and 12 with the edges of flaps 22 and 24 and thereby produce a sealed end closure for the carton which is siftproof.

FIGS. 6 to 10 of the drawings illustrate a preferred embodiment of the siftproof carton of the invention and the blank from which it may be formed. The blank (FIG. 6) is, in most respects, conventionally cut and scored to provide the same panels and flaps as the blank of FIG. 1, which are similarly numbered. It departs from the blank of FIG. 1, however, in the following respects:

Dust flaps 22 (which include flap portions 22a when the blank is folded and glued) and 24 (FIG. 6) are slightly wider than their supporting wall panels 18 and 20, respectively; the excess width being taken from the cover flaps 14 and 16 and from glue flap extension 22a, which border the dust flaps on their respective side edges. Further, the excess width portion of the dust flaps are

processed to weaken the fibre structure and render them readily yieldable to folding and compression.

In the most preferred embodiment, the excess width portions of the dust flaps are serrated to provide, preferably, substantially even-sized, evenly-spaced teeth-like formations or projections 50 separated by spaces 52. The innermost of the teeth 50 are preferably connected to the wall panels supporting the adjacent cover flaps 14 and 16, as the case may be.

The width and height of the teeth and the width and depth of the spaces between them may be on the scale of about $\frac{1}{32}$ of an inch.

The teeth or projections 50 may most conveniently be formed by provision of closely-spaced parallel rows of closely-spaced cuts between the dust flaps 22 and 24 and glue flap 22a, and the adjacent closure flaps 14 and 16; one of the rows, as 53, being in substantial alignment with the fold line defining wall panel 18 from wall panel 10 and wall panel 20 from wall panels 10 and 12 and glue flap 26 from wall panel 12; the other of the rows of cuts 54 being formed in the closure flaps 14 and 16. The cuts in each of the pairs of rows 53 and 54 are preferably staggered relative to one another and they form tear-lines which, when torn, provide teeth that project from each side edge of dust flaps 22 and 24. Teeth on one of the side edges of dust flap 22 are supplied by the glue flap extension 22a when the blank is glued and folded. The method and means for forming the closely-spaced rows of intermittent cuts 53 and 54 and of simultaneously weakening the fibre structure of the excess width and adjacent portions of dust flaps 22 and 24 are more fully described and claimed in my copending application Ser. No. 607,217, filed Jan. 4, 1967.

The embodiment of the blank for the carton of FIGS. 6 to 10, inclusive, further departs from the conventional in that the fold-lines 56 and 58, respectively, defining them from wall panels 10 and 12, respectively, are not straight, as is conventional, but are arched or pointed in the direction of the respective dust flaps. The blank of FIG. 6 further distinguishes over the conventional in that each of dust flaps 22 and 24 is provided with at least one fold-line 60 and 62, respectively, extending longitudinally from the respective fold-lines 56 and 58.

In order to seal the end of a carton formed from the blank of FIG. 6, the flat-folded and glued blank is opened into rectangular cross-section and the tear-lines between the dust flaps 22 and 24 and closure flaps 14 and 16 opened, as more clearly shown diagrammatically in FIG. 7 and then passed through the apparatus of FIG. 8, which is similar to the apparatus of FIG. 3. Preferably, mechanism for opening the tear-lines may be provided at the entry end of the apparatus. However, such tear-line opening means does not constitute any part of the present invention and it is not illustrated in the drawings.

It will be clear that since dust flaps 22 and 24 are slightly wider than the distance between walls 10 and 12, they are held in fixed relative position between rails 36 of the apparatus, the folding of such dust flaps over the opening between walls 10 and 12, as the carton progresses over the apparatus of FIG. 7, from station "A" to station "B," will cause the excess width of the dust flaps to overlie the end edges of walls 10 and 12. It will also be apparent that as closure flaps 16 and 14 are folded over the dust flaps as the carton progresses from station "C" to station "D," they will exert pressure on the edges of the dust flaps which, because of the shape of the fold-lines 56 and 58 at bases and the presence of the fold-lines 60 and 62 at their midpoints, and become longitudinally peaked along the center fold-lines 60 and 62, as more or less diagrammatically illustrated in FIG. 9 of the drawings. It will be understood that because the side edges of the dust flaps overlie the end edges of walls 10 and 12, their curling inwardly when wetted will be inhibited even in the initial stage of sealing. Such inhibition will be greatly enhanced when the carton reaches

station "E" and the marginal edge portions of walls 10 and 12 are compressed toward one another to more deeply underlie the side edges of the dust flaps. It will also be clear that the support afforded the side edges of the dust flaps against inward curling and their peaked shape at the time the closure flaps are folded over them, the dust flaps will offer resistance to the closure flaps, as they are folded over them, so that complete adhesion will be effected between them when the carton moves under pressure of block 40.

It will be seen from the diagrammatic illustration of FIG. 9 that the confining of the carton walls 10 and 12 between the rails 36 of the apparatus, with or without the use of shims 38, will cause the excess width of the dust flaps 22 and 24 to move downwardly into the carton as cover flaps 14 and 16 are folded thereover; this being the only direction in which such excess width is free to move. This will result in a positive contact between the edges of the dust flaps 22 and 24 and carton side walls 10 and 12 along the entire length of the dust flap edges, to thereby provide a siftproof seal.

The siftproof characteristics of the seal will be enhanced where the excess width of the dust flaps 22 and 24 is serrated, because the coating of glue as it is applied to the surface of the dust flaps either directly or indirectly will penetrate into the spaces between the serrations or teeth 50 and when such serrations are compressed as heretofore explained, the glue in the spaces between them will be pressed out, to form a positive adhesion between the side edges of the dust flaps and the adjacent side walls contacting them, to result in almost a hermetic seal between them. The softening of the excess width of the dust flaps when it is serrated, where effected, will still more perfectly seal the carton end because the softened fibre structure of the edges of the dust flaps will spread to substantially fill the spaces between the teeth and press more of the glue out of such spaces.

This completes the description of the siftproof cartons of the present invention and the methods by which they are formed. It will be readily apparent that the cartons of the invention are highly effective for their purpose and that they may be formed, set up, filled, and sealed as rapidly and as economically as similar, conventional cartons as heretofore used.

It will also be apparent that numerous variations and modifications may be made in the siftproof cartons of the present invention, in accordance with the principles of the invention hereinabove set forth, by anyone skilled in the art, without the exercise of any inventive ingenuity.

What I claim is:

1. A cardboard carton comprising two pairs of opposed wall panels connected to one another along their entire lengths, the wall panels of one of said pairs of wall panels each having a dust flap extending from at least one end thereof, each said dust flap having parallel side edges, the wall panels of the other of said pairs of wall panels each having a closure flap extending from its corresponding end; each said dust flap folded over the opening defined by said two pairs of wall panels; said cover flaps folded over said dust flaps, and a layer of adhesive provided between said cover flaps and said dust flaps securing them to one another, said layer of adhesive extending over the side edges of said dust flaps at least at their inner ends and contacting the inner surface of the wall panels of said other pair at least at their inner ends; said dust flaps having slight lateral enlargements at least at the inner end of each side edge thereof whereby at least the inner end of said dust flaps are of greater width than the distance between the other of said pairs of wall panels and are compressed against them.

2. The carton of claim 1, wherein the portion of the wall panels of said other pair of wall panels, immediately adjacent the portions thereof compressed against; the side edges of said dust flaps, slightly underlie the compressed edge portions of said dust flaps.

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3. The carton of claim 1, wherein said dust flaps have slight lateral enlargements at least at the inner end of each side edge thereof, said adhesive extends over said enlargements and said enlargements compressed against the adjacent portions of the wall panels of said other pair of wall panels.

4. The carton of claim 3, wherein said enlargements have a weakened fibre structure.

5. The carton of claim 4, wherein said slight enlargements extend the entire length of the side edges of said dust flaps.

6. The carton of claim 5, wherein the portion of the wall panels of said other pair of wall panels, immediately adjacent the side edges of said dust flaps, are compressed towards one another to slightly underlie said dust flaps.

7. The carton of claim 5, wherein said slight enlargements are serrated.

8. The carton of claim 7, wherein said serrations are closely and evenly spaced from one another.

9. The carton of claim 7, wherein said adhesive extends into the spaces between said serrations.

10. The cardboard carton of claim 1, wherein said dust flaps are defined from their connected wall panels by a fold line and each has a longitudinally-extending fold line formed therein at a midpoint thereof and oriented for folding in the same direction as said first-named fold lines.

11. The cardboard carton of claim 1, wherein said dust flaps are each defined from their connected wall panels by a fold-line of irregular shape and having an apex extending in the direction of the dust flaps, and a longitudinally-extending fold-line is provided in each said dust flap, at a midpoint thereof, oriented for folding in the same direction as said flap-defined fold-line and extending outwardly from said fold-line.

12. A one-piece tubular carton having pairs of opposed wall panels, said carton sealed at at least one end thereof, said seal formed of dust flaps and closure flaps hingedly connected to said wall panels, said dust flaps being wider at least at the point adjacent their wall-connected ends than the distance between the walls connected to said cover flaps, at least the edges of the wider portions of each said dust flap being defibrillated, said carton having a bead formed on two opposed corner edges thereof at said end, said beads being each composed of a portion of at least one closure flap and a portion of the wall panel to which said closure flap is hinged, said bead extending the length of said corner and enclosing at least a portion of one edge of each of said pairs of dust flaps.

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13. The carton of claim 12, wherein the edges of said dust flaps enclosed within said beads are adhesively secured to the inner surface of said beads.

14. The carton of claim 13, wherein at least a portion of said side edges of said dust flaps have tiny recesses formed therein and said recesses are substantially filled with adhesive material.

15. A glued and flat-folded blank for a tubular carton, said blank formed of a unitary section of sheet material such as cardboard and having fold-lines scored therein to define wall panels, and at least at one end thereof a plurality of flap extensions of said wall panels hingedly connected to said wall panels, said flap extensions including two dust flaps, said dust flaps having parallel side edges conditioned to have there the width between said two opposed side edges thereof reduced when pressure is applied against said side edges as the blank is set up and sealed.

16. The carton blank of claim 15, wherein said flaps include a pair of closure flaps and said dust flaps and closure flaps are partially joined together by a tear-line formed of a pair of closely-spaced parallel lines of staggered intermittent cuts, one of said lines of cuts being continuous with the fold-lines separating the dust flaps-connected wall panels from their adjacent wall panels, and the other of said lines of intermittent cuts formed in the adjacent closure flaps intermittent portions of cardboard fibre.

17. The carton blank of claim 15, wherein said dust flaps are each of a width slightly greater than the wall panel to which it is hinged.

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D. T. MOORHEAD, Primary Examiner