Sept. 29, 1942. R. M. BERGSTEIN 2,296,896

METHOD OF MAKING DUPLEX CONTAINERS

Filed Jan. 21, 1941

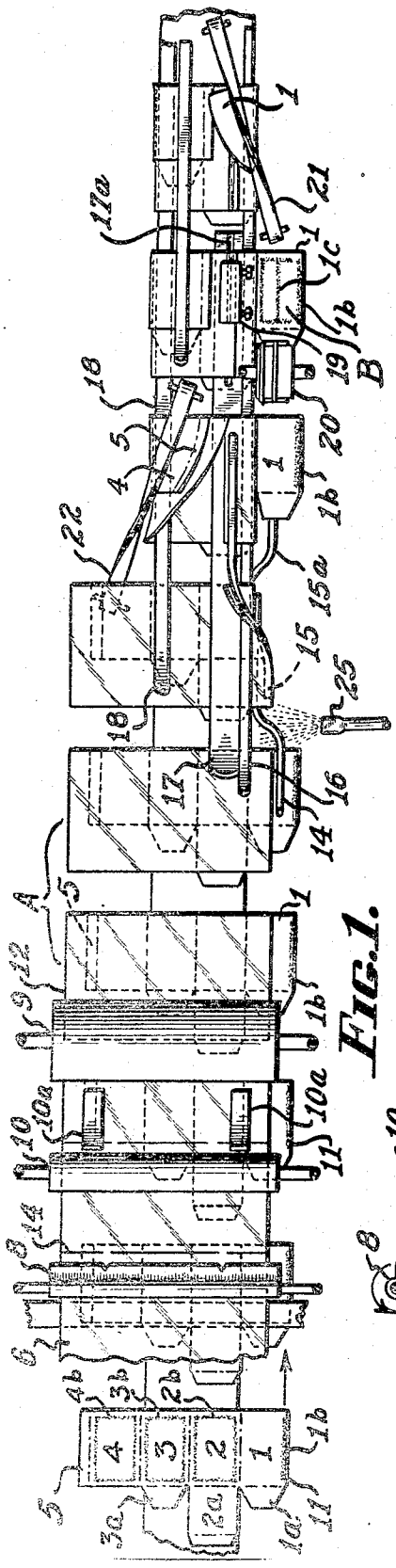


Fig. 1.

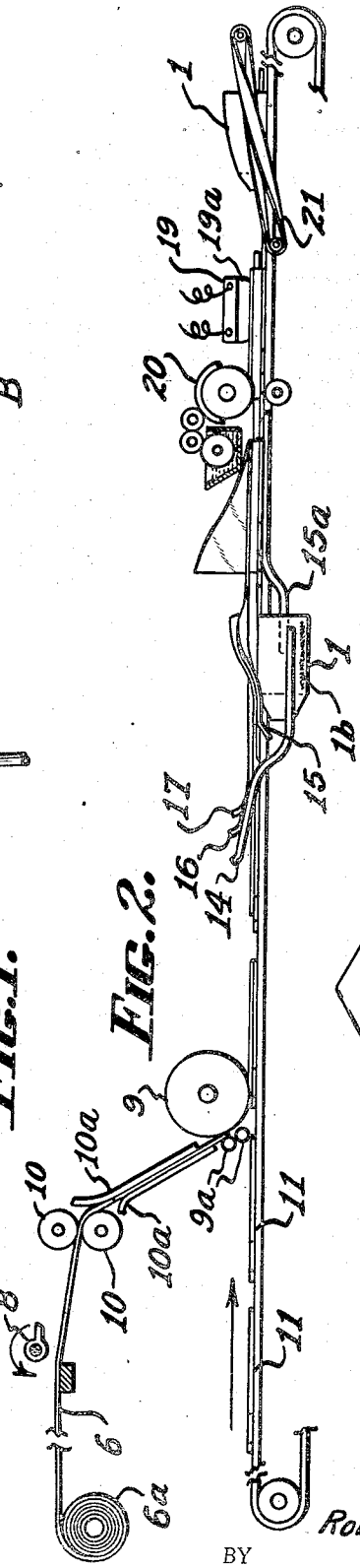


Fig. 2.

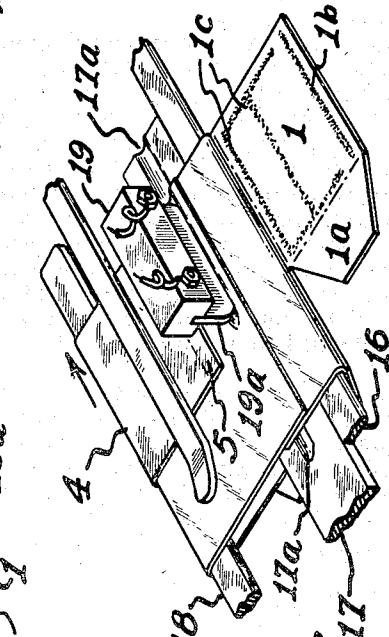


Fig. 4.

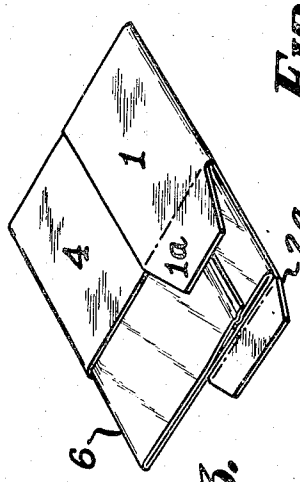


Fig. 3.

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METHOD OF MAKING DUPLEX CONTAINERS

Robert Morris Bergstein, Cincinnati, Ohio

Application January 21, 1941, Serial No. 375,098

16 Claims. (Cl. 93—36.01)

In my copending application Serial No. 319,102, filed February 15, 1940, I disclose methods of making a lined container. My present invention as disclosed herein relates to the formation of containers of a similar type, formed of two elements, an outer supporting shell or carton made of relatively heavy or rigid material such as cardboard or the like, and an inner lining element formed of relatively light and flexible material such as parchment, or Cellophane, or the like. One object of my invention is to make an inner lined container wherein the inner liner and the outer carton have separate independent seams, the seam of the inner liner preferably being secured by the heat fusion of thermoplastic coatings. Another object of my invention is to provide positive means of separating and underlying flap and an over-lying liner portion, to permit independent folding of said liner portion. Still further objects of my invention are to provide an upwardly facing exposed overlapped seam area of the liner, to permit effective heat-sealing of the liner seam without interference from the outer carton body, and to provide secondary adhesive application means whereby the carton wall initially free of attachment to the liner is secured thereto in the final container.

These and other objects of my invention will become clear as the description proceeds, it being understood that the invention is not limited to the specific embodiments herein shown and described, but by the appended claims.

In the drawing:

Figure 1 is a diagrammatic plan view illustrating various stages of my method and certain exemplary apparatus adaptable for automatic execution of my method.

Figure 2 is a side elevation of Fig. 1, being also diagrammatic in character.

Figure 3 is a perspective of the assembled container in its knockdown form as supplied to the consumer.

Figure 4 is a perspective view showing the container as it is conveyed past the heat sealing device.

Before outlining in detail the steps of the method, it will aid to an understanding to identify the blanks and liners and the terms we use in reference to them. Referring to the carton blank shown at the left side of Fig. 1, the blank has four main body panels 1, 2, 3, and 4, and to the outer panel 4 is articulated a glue flap 5. For the sake of clarity the outer panel 4 to which the glue flap is articulated will be referred to as the outer glue flap panel. Panel 1 will be referred to as the "other outer panel." Articulated to an end of panels 1, 2 and 3 are end closure flaps 1*a*, 2*a* and 3*a* respectively.

The lining material 6 is preferably a flexible sheet that is either inherently thermoplastic, or coated with a thermoplastic material on one side at least. As an example, it might be made from various grades of heat-sealable coated Cellophane, or materials such as parchment paper coated on one or both surfaces, with wax-resin mixtures such as mixtures of petroleum waxes and rubber hydrochloride resins. The process described starts with the lining material 6 being drawn from a supply roll 6*a*. A fly knife 8 may be employed to sever the lining material into unit sheet lengths, the sheets being engaged by a revolving cylinder 9 which deposits them on the surface of the carton blanks. It may be advantageous to cut the material incompletely to facilitate further feeding. The transverse cut is indicated at 14, and it will be understood that the peripheral speed of cylinder 9, being greater than that of the rolls 10, causes final severance of the sheet. There are auxiliary rolls 9*a* and guides 10*a* as shown, to guide and retain the sheet of lining material in position on the surface of the cylinder.

Moved along at spaced intervals by a conveyor are the carton blanks 11, which have been previously described. These may have been withdrawn from a hopper (not shown) by any conventional means, have been passed under an overhead glue wheel (also not shown) which has deposited stripes of adhesive on the inner surface of these blanks, that is, on the surface which is facing upwardly in the drawing, and the locations of these adhesive stripes are indicated by the shaded areas 1*b*, 2*b*, 3*b* and 4*b*. The lining mechanism, of course, is operated in timed relation to the travel of the carton blanks, and as each blank passes under the cylinder 9 a sheet of lining material is deposited thereon, and the liner and the carton blank are adhered together by the adhesive previously noted.

It is of particular importance to notice the position in which cylinder 9 deposits the liners on the blanks. Thi sis most clearly shown in stage A of the drawing, and it is also important to here note the position of the liner in relation to the stripes of glue on the surface of the carton blanks. In stage A it can be clearly seen that while the liner and the blank are approximately the same width, the liner has not been deposited in alignment with the carton blank, but has been so positioned on the blank that one edge of the

liner, that is, the upper edge 12 extends beyond the glue flap 5 of the carton blank while correspondingly the opposite edge of the liner is short of the edge of the lower panel 1 of the blank. It should be noted, too, that on the area of panel 1 which this right-hand portion of the lining material overlies, there are no adhesive stripes, so that the portion of the liner which overlies panel 1 is free and unsecured thereto. It can also be clearly seen from the drawing at stage A that the adhesive stripe 1b on the extreme lower edge of panel 1 is well beyond the termination of the lining material. This stripe is subsequently used for the adhesion of the panel 1 to the glue flap 5 of the outer carton, as will be later explained.

For the sake of clarity, the devices which follow are illustrated diagrammatically, as previously mentioned. As the blank having the liner thus deposited thereon continues its further course of travel, there is a curved guide or bar 14 which engages the upper exposed surface of panel 1 of the blank, between the edge of the liner and the glue stripe to depress this panel downwardly, as can be clearly seen from the drawing. Since the liner portion overlying panel 1 is not adhered thereto, as previously explained, this leaves the liner portion extending in its original plane, and in the further course of travel a folding rod 15 is introduced into this gap between the liner and the depressed panel 1 The depression of the panel by member 14 serves as a positive means whereby folder 15 can be brought into assured engagement with the unsecured liner portion, thereafter the folder member 15 is so shaped as to raise this unsecured portion of the liner and fold it inwardly as also shown. Positioned above the liner and adjacent to the fold line of panel 1, is a stationary sword 16 over which the folder member 15 folds this unsecured liner portion, the sword serving to assure accurate folding of the liner along the desired line of fold.

When the liner is of light or extremely limber material it will be advantageous to employ an air blast to assist in the separation of the liner from panel 1. In Fig. 1 I have indicated at 25 an orifice for directing a flow of air to support the liner while panel 1 is turned downward and until the liner is engaged by the member 15.

After the free and unsecured liner portion has been folded inwardly from the surface of panel 1 a guide bar 15a returns the panel to its normal horizontal position whence it is engaged by a timed auxiliary glue wheel 20 which wheel applies stripes 1c of adhesive to the panel, as shown at B. Lying parallel to and substantially in the plane of sword 16 is a former plate 17, so that when the fold effected on the unsecured liner portion by the folder 15 has been completed, this unsecured portion overlies both the sword 16 and the former plate 17.

Also during the course of travel the upper panel 4 of the carton and the overlying portion of the liner is raised and folded inwardly. This may be done by twisted stationary members or by the standard type of twist belts as indicated at 22 commonly used for turning carton panels and widely known in the art. In conjunction with this folding action there is sword 18, positioned above the liner adjacent to the fold line of the panel 4 and upon the completion of this folding action the container is in the form shown at B. As here shown the edges of the liner are now in overlapped relation, and these overlapped edges are both on top of or over the surface of the former plate 17.

There is a groove 17a in the former plate and working in coordination with this groove there is an overhead heating unit 19 having a tongue 19a cooperating with the groove 17a. As shown at B this heating unit is positioned to fuse by heat-sealing a seam between the overlapped margins of the inner liner, and it can be seen that the former plate 17 which is introduced between the overlapped plies and the under-side of the inner liner, prevents the heat from penetrating through to the other side and acts as a support to assure the proper heat fusion of the overlapped marginal liner plies.

After leaving the position B and in the course of further travel, the outer panel 1 is folded inwardly by conventional means such as twister belts indicated at 21 and the containers may now be stacked under slow moving pressure belts of conventional design (not shown) which apply the necessary pressure to assure adhesion.

The general style of container illustrated in the drawing is similar to that shown in my copending application No. 310,789, filed December 23, 1939. In this construction, which has a flush top of the liner and carton edge at one end and an extension of the liner and closure flaps at the other end, it is desirable, as pointed out in said copending application, that with the flush top the liner be well secured to all the carton walls, and it will be noted that by my invention as disclosed herein I have been able to achieve this objective. Through the use of the separation of the outer panel from the overlying portion of the liner, and the independent liner folding followed by a secondary adhesive application on the underlying panel prior to folding it over, as explained, I achieve a container wherein all the carton walls may be secured to the liner, and I consider this an important feature of my invention. However, it is not intended to limit my invention as herein disclosed to a particular form of blank or relative location of liner and blank, as for example it is apparent that the carton could readily be the type shown in my previously mentioned co-pending application Serial No. 319,102, which has closure flaps on both ends thereof, or other suitable modifications as desired.

Among other things, it can also be seen that by the arrangement disclosed in my method herein I have provided an assured and dependable folding of the unsecured liner portion. Since the carton flap underlying this unsecured liner portion extends out beyond the edge of the liner portion, any normal folding means starting to operate would affect the carton flap rather than the liner. By arranging to change the plane of the underlying flap, to provide a clearance space or gap between the unsecured liner portion and the flap, I can introduce a positive means whereby the liner can be lifted independently.

In connection with the raising of the liner the supporting swords on the inside of the fold, that is, along the line of fold to be made, are also a feature of importance, to assure neat and accurate folding along predetermined lines. If desired, instead of using separate swords and former plate, it is apparent that a single plate might be used, the edges of which would be properly aligned with the lines of fold desired, so that a single plate would serve the purpose of a sword for folding of both opposite sides and the liner

of the carton, and likewise serve as the former plate against which the heating of the overlapped liner portions can be carried out.

The type of heating arrangement shown wherein there is a groove in the forming plate, is my preferred arrangement, and the uses and features of this arrangement in connection with forming heat seams are described in my U. S. Patents Nos. 2,114,621, 2,114,622, 2,114,623, 2,114,624 and 2,114,625. It is apparent that other types of heating arrangement for forming the liner seam might be used if desired as for example, heated rollers or other devices, and the particular arrangement shown for the heating is merely representative.

It is also apparent that variations in the application of adhesive might be used if desired, instead of those as shown in the drawing. For the formation of the carton seam, the adhesive may, if desired, be applied to the under side of the glue flap instead of to the upper side of the outer edge of the outer panel. In regard to the adhesion between the lining sheet and the carton blank it is apparent also that, if desired, the adhesive might be applied to the under surface of the liner instead of to the meeting surface of the blank as shown in my preferred method; the necessary requisite in both these cases being the introduction of adhesive means between the meeting surfaces before they are brought into superposed position. In regard to the order of folding after the liner has been secured to the blank I may also if desired modify the order of the steps by first folding in the panels having the liner extending beyond the edge thereof, and thereafter folding in the unsecured opposite edge of the liner, this folding being done of course over a forming plate; and then after the seam has been formed in the liner complete the operation by folding in the other outer carton panel. Whether the folding is carried out by this method or by my preferred method as previously described, it can be seen that the same essential factors are present in that by a series of folding operations involving the folding simultaneously of a panel with a liner extending beyond it, and the independent folding of another unsecured liner portion, an overlapped, exposed (i. e. uncovered by the outer carton) liner portion, wherein a seam between the overlapped margins can be readily effected by the application of heat, is provided. Then subsequently an outer panel is folded inwardly with no further liner manipulation.

And in connection with the procedures described in the preceding paragraph it is to be noted that the secondary separate adhesive application to assure the adhesion of the last-folded panel can be carried out at any stage of the process after the unsecured liner portion has been folded in from said panel. It is obviously a matter of choice according to the mechanism employed as to just what stage this secondary adhesive application is effected, so long as it is introduced between the step of the separation and infolding of the unsecured liner portion and the step of infolding the outer panel which previously had been in underlying relation to said unsecured liner portion. And as previously stated the results achieved by this secondary adhesive application I consider an important feature of my invention and is particularly useful in the fabrication of containers such as those described in my previously mentioned copending application Serial No. 310,789, filed December 23, 1939.

Another feature of importance in my invention is the introduction of the interior forming plate over which the lapped margins of the liner are folded. Without the use of this device any heat applied to the seam portion would be transmitted to the opposite underlying wall with the result that the seam portion would be adhered to that wall and the desired tubular structure would not be achieved. So that by the use of a forming plate I provide not only means of obtaining a uniform fixed surface against which a heated element can operate to assure a uniform and dependable seam, but at the same time I prevent heat so applied from affecting other portions of the liner.

My invention is well adapted to be carried out efficiently on existing machinery, with relatively simple modifications. For example, the lining may be done on a conventional Cellophane-window-applying or lining machine and subsequently the lined carton blanks may be completed on a conventional type gluing and folding machine, merely by modifying the gluing and folding machine to incorporate the several particular novel devices, of my invention, including the means for separating the underlying panel from the overlying unsecured liner portion, the forming plate, the heating unit, and the others which have been previously outlined in detail. As a matter of fact I at times may find it advantageous to carry out my process on two separate mechanisms, particularly if a type of adhesive is used which does not set instantly, as in that event if there is some time lapse between the lining operation and the subsequent folding and gluing operation, the adhesive will have had time to set, and the folding accuracy is thereby increased.

As previously mentioned my outer container may take a variety of forms, having closure flaps of any desired nature either on one end or both as desired, and the liner extensions may be left free and unsecured of the end closure flaps as shown in the drawing, for the purpose of permitting subsequent independent sealing of the liner end, or the liner may be adhered to all or any number of the main body carton walls or the end closure flaps as desired. If desired, too, the glue flap might be articulated to the flap last folded over, in which event the glue flap, of course, would thereby be adhered to the outside rather than the inside of the other outer panel, and these and other variations are within the scope of my invention, so long as the essential features as previously described are carried out.

Having thus described my invention, what I claim as new and desire to secure by Letters Patent, is:

1. The method of making knockdown containers which includes providing flat cut and creased blanks with flexible, fusible liners secured to the inner surface thereof in such manner as to project at one margin, moving along said blanks with said liners thereon and providing fixed overhead means in the course of travel to define opposed edges over which said liner is folded and to provide a plate against which to form a seam, one of said edges adapted to define the fold of an independent liner portion which may be lapped upon the projecting margin of said liner and secured thereto, the other of said edges adapted to define the simultaneous fold of liner and blank portions.

2. The method of making knockdown containers which includes providing flat cut and creased blanks with flexible, fusible liners secured to the

inner surface thereof, moving along said blanks with said liners thereon and providing fixed overhead means in the course of travel to define opposed edges over which said liner is folded, one of said edges adapted to define the fold of an independent liner portion and the other of said edges adapted to define the simultaneous fold of liner and blank portions, and fixed supporting means intermediate said edges over which margins of said liner portions lie when so folded, and against which a seam can be effected in the liner by fusion.

3. The method of making lined containers which includes an initial adhesive application between predetermined meeting surfaces of a flexible liner and a carton blank, and thereafter a folding of a marginal portion of said liner which is free and unsecured from an outer carton blank panel which it overlies, and a secondary adhesive application to surface portions of said outer carton blank panel, prior to an inward folding of said panel to secure said panel to said folded liner portion.

4. The method of making lined containers wherein all panels of an outer carton body are secured to an inner flexible liner, which includes an initial adhesive application to inner surface areas of all panels except one outer panel thereof, the application of a flexible liner thereto with one of its edges overlying said aforementioned outer panel, a folding of said unsecured liner portion inwardly, and a secondary adhesive application to said outer panel, prior to an inward folding of said panel to secure said panel to said folded liner portion.

5. The method of forming seams in flexible heat-fusible liners secured in offset relation to the inner surface of predetermined panels of carton blanks, which includes the steps of simultaneously folding over the extended liner edge, and the panel thereunder, and separately folding in the opposite recessed liner edge over a forming plate interposed between the remaining unfolded area of said liner and the aforesaid folded portions, whereby an upwardly facing overlapped area of said liner margins is exposed on said forming plate for facilitating seam-forming juncture therebetween.

6. The method of forming seams in flexible heat-fusible liners secured in offset relation to the inner surface of predetermined panels of carton blanks, which includes the steps of simultaneously folding over the extended liner edge, and the panel thereunder, and separately folding in the opposite recessed liner edge over a forming plate interposed between the remaining unfolded area of said liner and the aforesaid folded portions, whereby an upwardly facing overlapped area of said liner margins is exposed on said forming plate for facilitating seam-forming juncture therebetween, and applying heat to said overlapped area prior to folding over said remaining outer flap.

7. A method of making containers in knockdown form which includes providing cut and creased carton blanks having a glue flap articulated to one outer panel, securing a flexible liner to portions of the inner surface thereof with one edge of said liner projecting beyond said glue flap and the opposite edge of said liner inset from the edge of the opposite outer carton panel, the overlying liner portion being unsecured to said last-named panel, and separating said inset liner portion and said outer panel and folding in said unsecured liner portion independently of said outer panel, and thereafter folding in said first-mentioned panel and articulated glue flap simultaneously with the overlying liner portion secured thereto, there being a forming plate introduced between the surface of the unfolded liner area and the infolded opposite liner portions.

8. A method of making containers in knockdown form which includes providing cut and creased carton blanks having a glue flap articulated to one outer panel, securing a flexible liner to portions of the inner surface thereof with one edge of said liner projecting beyond said glue flap and the opposite edge of said liner inset from the edge of the opposite outer carton panel, the overlying liner portion being unsecured to said last named panel, and separating said inset liner portion and said outer panel and folding in said unsecured liner portion independently of said outer panel, and thereafter folding in said first-mentioned panel and articulated glue flap simultaneously with the overlying liner portion secured thereto, there being a forming plate introduced between the surface of the unfolded liner area and the infolded opposite liner portions, and applying heat to the overlapped margins of the folded liner portions on said forming plate.

9. A method of making containers in knockdown form which includes providing cut and creased carton blanks having a glue flap articulated to one outer panel, securing a flexible liner to portions of the inner surface thereof with one edge of said liner projecting beyond said glue flap and the opposite edge of said liner inset from the edge of the opposite outer carton panel, the overlying liner portion being unsecured to said last-named panel, and separating said inset liner portion and said outer panel and folding in said unsecured liner portion independently of said outer panel, and thereafter folding in said first-mentioned panel and articulated glue flap simultaneously with the overlying liner portion secured thereto, there being a forming plate introduced between the surface of the unfolded liner area and the infolded opposite liner portions, applying heat to the overlapped margins of the folded liner portions on said forming plate, and folding in said opposite outer panel, adhesive having been applied between the meeting surfaces thereof and the folded liner portions.

10. A method of making containers in knockdown form which includes providing cut and creased carton blanks having a glue flap articulated to one outer panel, securing a flexible liner to portions of the inner surface thereof with one edge of said liner projecting beyond said glue flap and the opposite edge of said liner inset from the edge of the opposite outer carton panel, the overlying liner portion being unsecured to said last-named panel, and separating said inset liner portion and said outer panel and folding in said unsecured liner portion independently of said outer panel, and thereafter folding in said first-mentioned panel and articulated glue flap simultaneously with the overlying liner portion secured thereto, there being a forming plate introduced between the surface of the unfolded liner area and the infolded opposite liner portions, and applying heat to the overlapped margins of the folded liner portions on said forming plate, and folding in said opposite outer panel, adhesive having been applied between the meeting surfaces thereof and the folded liner portions, and applying pressure to secure adhesion both between the liner and the folded carton blank and between the glue flap and the opposite outer panel.

11. The process of providing independently heat-seamed lined cartons in knockdown form which includes moving along blanks having fusible lining sheets secured to a surface thereof, and during the course of travel causing said lined surface to pass adjacent a fixed forming plate, the edges of which substantially define the two lines of fold of the final folded container, and folding a liner portion independently over one of said edges and folding an opposite liner portion and the underlying blank panels simultaneously over the opposite of said edges, whereby marginal portions of said liner are brought into superposed position on the surface of said forming plate.

12. The process of providing independently heat-seamed lined cartons in knockdown form which includes moving along blanks having fusible lining sheets secured to a surface thereof, and during the course of travel causing said lined surface to pass adjacent a fixed forming plate, the edges of which substantially define the two lines of fold of the final folded container, and folding a liner portion independently over one of said edges and folding an opposite liner portion and the underlying blank panels simultaneously over the opposite of said edges, whereby marginal portions of said liner are brought into superposed position on the surface of said forming plate, and applying heat to said superposed marginal portions while so positioned on said forming plate.

13. The method of making knockdown containers which includes adhering surface portions of a relatively flexible sheeting to the inner surface of a pre-scored blank made of relatively rigid material, and folding both marginal portions of each of said elements into overlapping position in such manner as to form first an overlapped condition of the inner element uncovered by any portion of the said blank, securing the overlapped margins of the inner element, overlapping the margins of the outer element and securing the overlapped margins of the outer element.

14. The method of making knockdown containers which includes securing a flexible, fusible liner to a predetermined inner surface area of a pre-scored blank, moving said united elements along, and, during the course of travel, folding opposite marginal liner portions into overlapped position over a forming plate interposed between said overlapped liner portions and the remaining unfolded liner portions, applying heat to form a seam between said overlapped margins, and thereafter bringing opposite edges of said pre-scored blank into overlapped position and securing said edges together.

15. The method of making knockdown, lined containers which includes the steps of moving along a pre-scored carton blank, having a flexible liner secured to the inner surface thereof, with a portion of said liner inset from the edge of an outer panel of said carton blank, deflecting said outer panel away from the plane of said liner portion, folding said liner portion inwardly, and folding said outer panel inwardly.

16. The method of making knockdown, lined containers which includes the steps of moving along a pre-scored carton blank having a flexible liner secured to the inner surface thereof, with a portion of said liner inset from the edge of an outer panel of said carton blank, deflecting said outer panel away from the plane of said liner portion, folding said liner portion inwardly, applying adhesive to one of the meeting surfaces of said liner portion and said outer panel, and folding said outer panel inwardly.

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