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METHOD OF FORMING BOX TOPS TO BOXES

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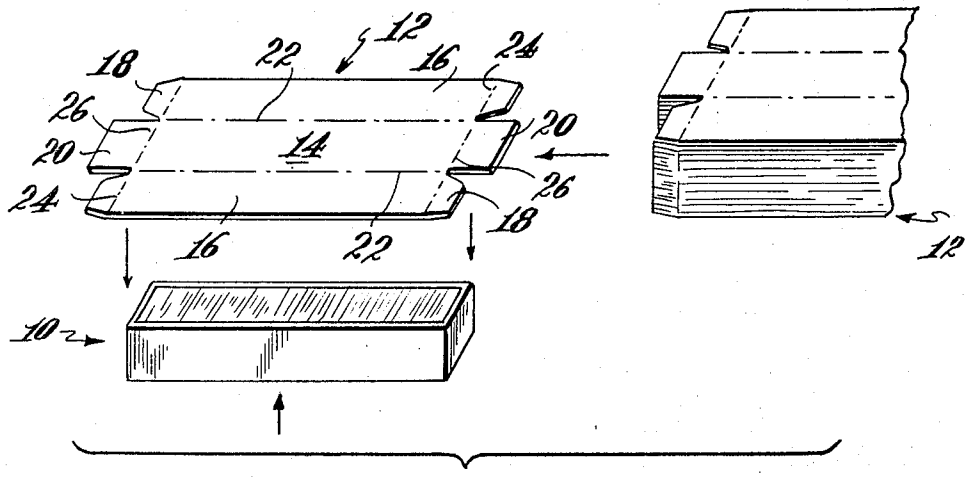


Fig. 1

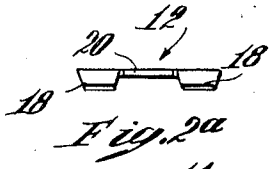


Fig. 2a

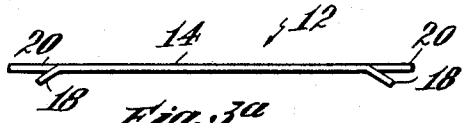


Fig. 3a



Fig. 2b

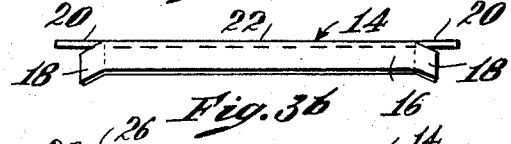


Fig. 3b



Fig. 2c

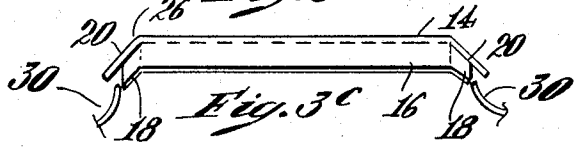


Fig. 3c



Fig. 2d

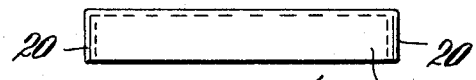


Fig. 3d

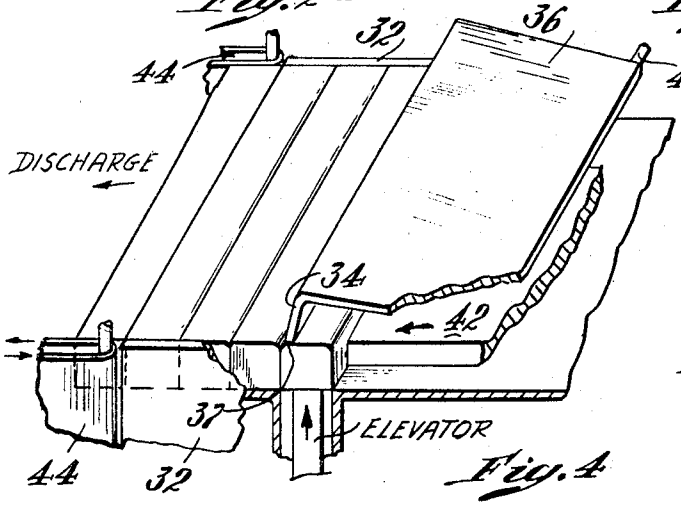


Fig. 4

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METHOD OF FORMING BOX TOPS TO BOXES

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ABSTRACT OF THE DISCLOSURE

The method of folding a flat box top blank by supporting it in engagement with the open top of the box to which it is to be applied and then folding the side and end panels of the blank into engagement with the sides and ends of box and securing them by means of corner flaps at the ends.

Employment of a preformed box already filled as a mandril about which a flat box top blank is folded and secured is not new as disclosed in the Brock Patent 2,848,-856. However, this invention concerns an improved method of applying, folding and securing a flat box top blank directly to an already formed and filled box which comprises bringing the preformed box and a flat cover blank together so that the center panel of the box confronts and engages the open top of the box and the panels and flaps extend laterally therefrom; partially folding the end flaps, side panels and end panels so that the side and end panels are situated at angles to the sides and ends of the box and the end flaps are situated between the end panels and the ends of the box with their upper edges beneath the end panels, finish folding the side panels from said angular positions into engagement with the sides of the box, applying adhesive to the inner surfaces of the end panels, and then finish folding the end panels from said angular positions into engagement with the ends of the box and the end flaps situated therebetween. Optionally, a normally nontacky adhesive may be preapplied and activated when the end panels are engaged with the ends of the box. The panels and flaps are folded successively by first folding the end flaps relative to the side panels, then folding the side panels relative to the center panel and finally folding the end panels relative to the center panel. The adhesive is now applied to the end panels whereupon the side panels are folded into engagement with the ends of the box. The boxes are covered in succession and as a top is supplied to each box it is moved while the panels are constrained against the sides and ends to a position to form a column of boxes wherein the side panels of the boxes are held engaged with the sides of the boxes by engagement of the boxes with each other until the applied adhesive sets or if the adhesive as been preapplied until it is activated and sets. The side panel at the back side of the last box in the column is held engaged with the side of that box until a succeeding box is moved into alignment with the column by a retainer movable to an out of the way position by movement of the next box into alignment with the column, and a pusher employed to advance the column a distance corresponding to the width of the box. The column is advanced one box width at a time with the end panels held firmly engaged with the ends of the boxes until the adhesive becomes adhesively tacky or activated and then pressure is applied to the end panels and maintained until the end panels become firmly bonded to the end flaps.

The method will now be described in greater detail with reference to the accompanying drawings wherein:

FIG. 1 diagrammatically illustrates the initial position of a preformed and filled box with respect to a flat box cover blank which has been moved from a stack of blanks to a position above the preformed box;

FIG. 2*a* is an end view of the cover blank showing the flaps at the ends of the side panels partially folded;

FIG. 2*b* is a corresponding view showing the side panels partially folded;

FIG. 2*c* is a corresponding view showing the end panels partially folded;

FIG. 2*d* is a corresponding view showing the completely folded blank;

FIG. 3*a* is a side view of the flat blank showing the flaps at the ends of the side panels partially folded;

FIG. 3*b* is a corresponding view showing the side panels partially folded;

FIG. 3*c* is a corresponding view showing the end panels partially folded;

FIG. 3*d* is a corresponding view showing the blank completely folded; and

FIG. 4 diagrammatically illustrates in perspective the movement of the covered box into alignment with a column of previously covered boxes for movement toward a place of discharge and holding the side and end flaps in position to perfect adhesion of the end panels to the end flaps.

As related above, this invention is concerned with a method of employing a preformed, preferably filled box or container as a mandril about which a flat box top blank is folded and secured. In FIG. 1 a typical preformed box **10** is illustrated and directly above it a flat box top blank **12** embodying a center panel **14**, side panels **16** which have at their opposite ends end flaps **18**, and end panels **20**. The side panels **16** are folded relative to the center panel **14** on fold lines **22**, the end flaps **18** are folded relative to the side panels **16** on fold lines **24**, and the end panels **20** are folded relative to the center panel **14** on fold lines **26**.

As shown, the side panels **16** and **20** are of corresponding width nad the end flaps **18** are somewhat shorter than the end panels **20**. The blank is uncoated, that is, no adhesive is preapplied for securing the folded panels and flaps. It is within the scope of the invention to apply an adhesive which is normally nontacky and which can be activated, for example, by heat at the time the parts are brought into engagement for sealing.

In accordance with the method herein illustrated, after positioning a flat blank **12** above the open top of the preformed box **10**, which may be delivered to this point from any suitable place, the box **10** is raised into engagement with the underside of the blank **12** so that the center panel **14** is in registration with the open top of the box and engages the edges thereof, in which position the panels and flaps extend laterally from the sides and ends of the box. Folding devices are provided for forming the panels and flaps to the sides and ends of the box; however these are not disclosed herein since the successive steps of folding may be performed with any suitable means even by hand and comprises first breaking the end flaps **18** on the fold lines **24** so that they are bent at angles to the side panels **16** as shown in FIGS. 2 and 2*a*. After the end flaps **18** are thus partially folded, the side panels **16** are broken on the fold lines **22** so that they are bent at angles to the center panel **14** as shown in FIGS. 2*b* and 3*b*. The partially folded side panels **16** support the end flaps **18** opposite the ends of the box with their upper edges beneath the end panels **20**. The end panels **20** are now broken on their fold lines **26** and depressed to partially folded position as shown in FIGS. 2*c* and 3*c*, against the upper edges of the end flaps **18**, and this pressure as it continues to be applied to the end panels **20** assists in folding the side panels **16** into engagement with the side and end flaps **18** into closer engagement with the sides and ends of the box. Accord-

ing to one mode of operation adhesive is now applied to the inner surfaces of the end panels **20** while they are held in their partially folded position, for example, by means of applicator fingers **30** (FIG. 3*c*), or by any equivalent means, for example nozzles or rollers. Following application of adhesive the end panels **20** are folded from their angular positions into intimate engagement with the ends of the box against the end flaps **18**. The folding of the top is now complete and the covered box, as shown in FIG. 4, is raised while the sides and ends of the cover are constrained against the sides and ends of the box to a position for discharge.

Successive covered boxes are raised to form a column of boxes which is moved laterally between spaced parallel guides **32—32** which hold the end panels in position pending formation of a bond. The side panels of the boxes in the column are held during this time in position by engagement of the side panels of each box with the preceding and succeeding boxes. The side panel at the exposed side of the last box of the column is held in position until the next covered box is raised into alignment with the column by a retainer plate **34** supported by a part **36** in a vertical position parallel to and in the plane of the exposed side wall of the last box in the column. The retainer plate **34** has a lower edge **37** which is situated above the top of the next box which is to be raised to the position for discharge and as the box is raised it lifts the retainer plate **34** about pivots **40** to an out of the way position. During elevation the side panel at the rear side of the box is held in position by engagement with a pusher **42** which is situated rearwardly of the retainer plate and parallel thereto and which is operable to push the entire column of boxes forwardly the width of a single box. When the rear edge of the raised box, as it is moved forwardly, clears the lower edge of the retainer plate, the latter falls down into operative position behind the side panel at the rear side of the forwardly displaced box and holds the side panel in place while the pusher retracts to its rearmost position and until the next box is elevated into alignment with the column.

The boxes are advanced step by step the width of a single box with their end panels firmly confined by the guides **32—32** to prevent the end panels from swinging away from the end flaps for a distance such as to permit the applied adhesive to become adherently tacky before pressure is applied whereupon the boxes are advanced between moving pressure-applying belts **44—44** which maintain the pressure applied to the end flaps for a sufficient length of time to insure complete adherence of the end panels to the end flaps. Alternatively, as indicated above, adhesive may be preapplied to the blank prior to folding and activating during movement of the folded box between the guides **32—32** so as to condition it for uniting the end flaps to the end panels during movement between the pressure-applying belts **44—44**.

The cycle of a complete operation commences with the box top blank above the preformed box by movement of the box into engagement with the blank, continues for the folding of the panels and flaps into engagement with the sides and ends of the box, elevation of the completed box to a position for its discharge in the form of a column, holding the end and side panels while the adhesive is activated, applying pressure to the end panels to make a good bond, and then discharging the completed box.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. The method of applying a box top to an open top box, said box top embodying a flat blank having a center panel, side panels at the longitudinal edges with end flaps at their ends, and end panels at the ends of the center panel, said panels and flaps being connected for folding on preformed folding lines, comprising applying an adhesive to the inner surfaces of the end panels, partially folding the end flaps, side panels and end panels so that the side and end panels are situated at angles to the sides and ends of the box and the end flaps are situated between the end panels and the ends of the box with their upper edges beneath the end panels, folding the side panels from said angular position into engagement with the sides of the box and then folding the end panels from said angular position into engagement with the ends of the box and the end flaps situated therebetween.

2. The method according to claim **1**, wherein the adhesive is applied to the end panels after the side panels have been folded into engagement with the sides of the box.

3. The method according to claim **1**, wherein the adhesive is applied to the end panels while the end flaps and end panels are held in the partially folded position.

4. The method according to claim **1**, comprising moving each box after the cover has been applied thereto into a position to form a column in which the side panels of the successive boxes are held in position against the sides of the boxes by engagement of the sides of the boxes with each other except for the rearmost side panel of the last box in the column, alternately applying translatory and nontranslatory pressure to the rear side of the last box in the column to move the last box forwardly the distance of one box and hold it at said position, and at said forwardly displaced position moving a new box into alignment with the column at the rear side of said forwardly displaced box while simultaneously withdrawing the holding pressure from the forwardly displaced box and applying it to the rear side of the new box.

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