

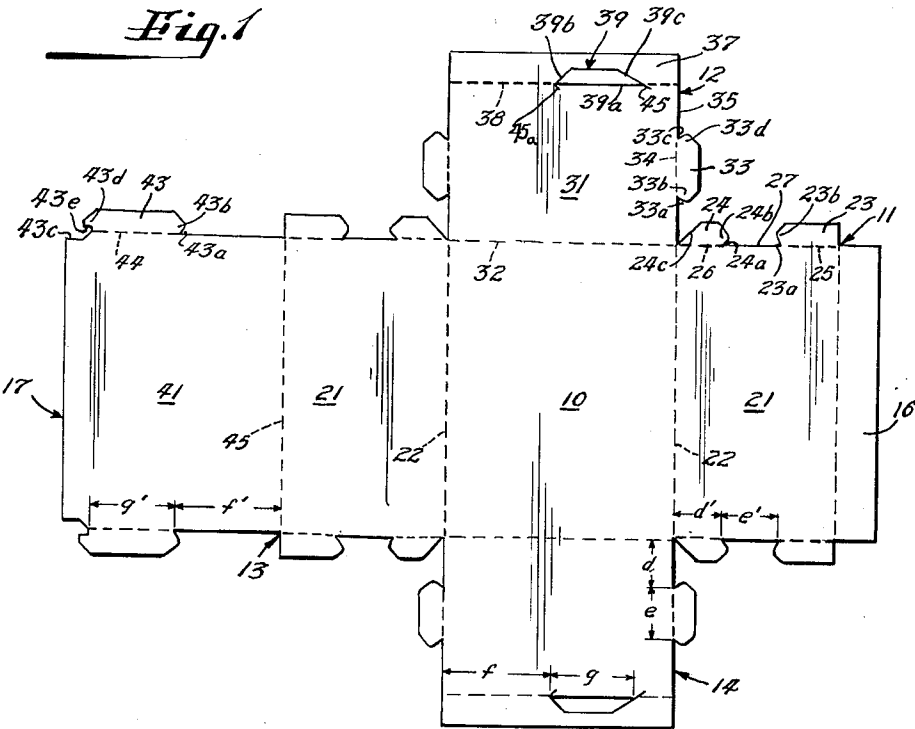
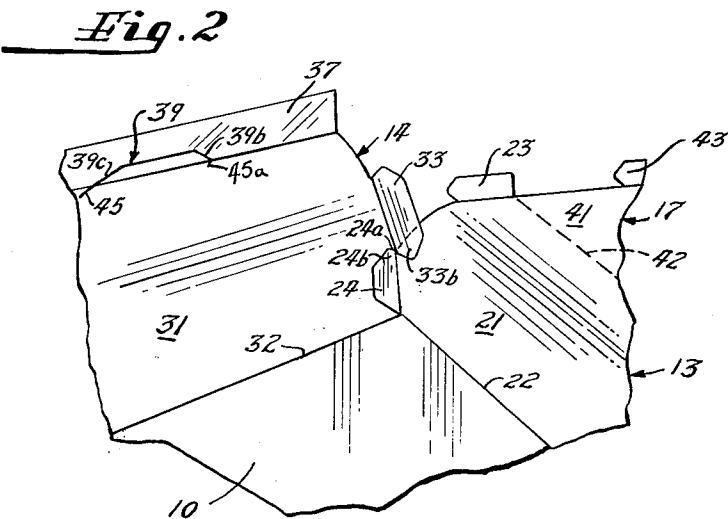
April 17, 1962

J. E. DRUMMOND
FOLDABLE BOX

3,029,996

Filed Feb. 19, 1959

2 Sheets-Sheet 1



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2 Sheets-Sheet 2

Fig. 3

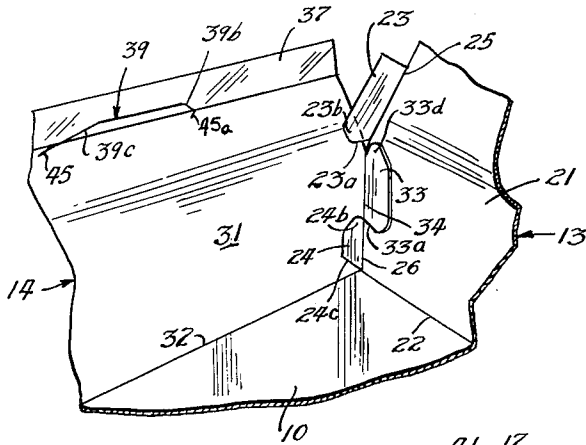


Fig. 4

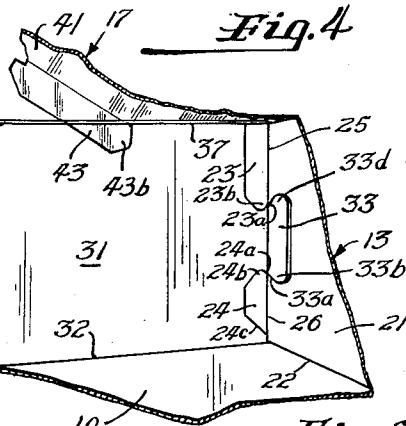


Fig. 5

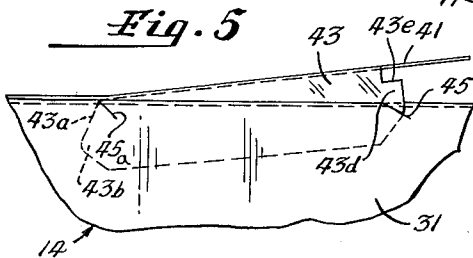


Fig. 6

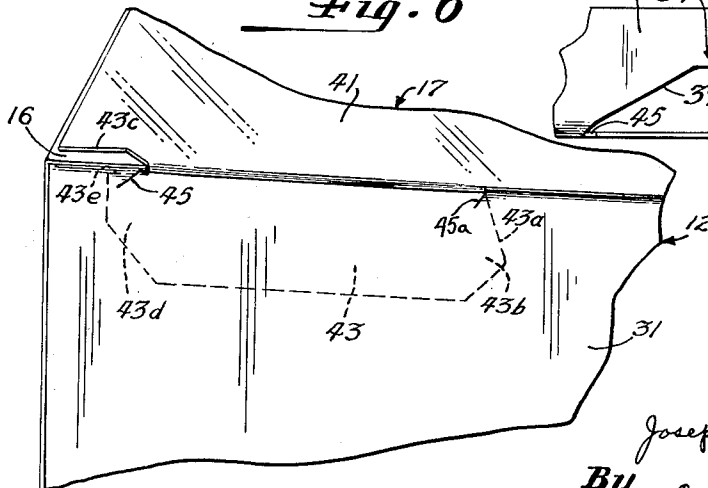
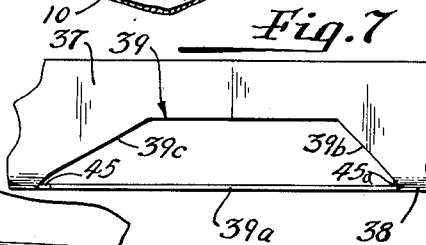


Fig. 7



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FOLDABLE BOX

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9 Claims. (Cl. 229—36)

The present invention relates to improvements in foldable boxes which can be erected without the use of adhesives.

An important object of this invention is to provide a foldable box which can be rapidly erected without the use of adhesives and which forms a rigid and durable container.

Another object of this invention is to provide an improved arrangement for interlocking the side panels of the box into corner forming relation which will enable the box to be rapidly erected by mechanical equipment.

A more particular object of this invention is to provide an improved corner construction for a foldable box including a bottom panel and side panels articulated along adjacent side edges of the bottom panel and in which one side panel has a tongue thereon insertable through a slot in the other side panel and in which the last-mentioned side panel has a tongue insertable through a slot in the first-mentioned side panel to thereby rigidly secure the side panels together in corner forming relation.

Yet another object of this invention is to provide an improved arrangement for locking the hinged cover in its container closing position.

Still another object of this invention is to provide a box which, when erected and closed, has no exposed flaps nor openings therein to thereby provide a smooth external appearance.

These, together with various ancillary objects and advantages of this invention will be more readily appreciated as the same becomes better understood by reference to the following detailed description when taken in connection with the accompanying drawings wherein:

FIGURE 1 is a plan view of the overall box blank;

FIGS. 2 and 3 are fragmentary perspective views of the interior of one corner of the box illustrating the manner in which the tabs on adjacent side panels are moved into interlocking relation as the side panels are moved into corner forming positions;

FIG. 4 is a fragmentary perspective view of the interior of one corner of the box illustrating the side panels in corner forming position and the cover panel in a partially closed position;

FIG. 5 is a fragmentary side elevational view illustrating the manner in which the tab on the cover panel is moved into locking engagement with the side panels of the box;

FIG. 6 is a fragmentary perspective view of the exterior of one corner of the box illustrating the cover in its fully closed position; and

FIG. 7 is a fragmentary top plan view illustrating the flap on one of the side panels and the opening in the flap for receiving the cover locking tab.

In the embodiment of the invention illustrated in the drawings, all six sides of the container are formed from a single blank and, for convenience in describing and claiming the invention, the terms bottom, side and cover are used herein to designate different portions of the box, it being understood that such designations are arbitrary. As best shown in FIGURE 1, the blank includes a bottom panel 10 and four side members respectively designated 11, 12, 13 and 14, which are connected to the bottom panel. A top flap 16 is articulated to the upper edge of one of the side members 11 and a cover member 17 is

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connected to the upper edge of the opposite side member 13.

The side members 11 and 13 are preferably identical in construction and include a main panel 21 articulated to the bottom panel 10 along main fold lines 22. Upper and lower tabs 23 and 24 are hinged along fold lines 25 and 26 at spaced points along both side edges 27 of the panels 21. The side members 12 and 14 are also preferably identical in construction and each include a side panel 31 articulated to the bottom panel 10 along a fold line 32 disposed at right angles to the fold lines 22. The side members 12 and 14 have intermediate tabs 33 hinged to the panels 31 along fold lines 34 at opposite side edges 35 of the panels. The tabs 33 are arranged to interlock in a manner described more fully hereinafter with the tabs 24 and 23, when the panels 21 and 31 are in corner forming relation. The side members 31 also include a top flap 37 articulated along a fold line 38 at the end edges of the panels 31, and which top flaps have a slot or opening 39 therein, for a purpose to be described hereinafter. The cover member 17 includes a panel 41 articulated along a fold line 45 to the upper edge of one of the side panels 21, and locking tabs 43 hingedly connected along fold lines 44 at the side edges of the cover panel. The locking tabs 43 are arranged to extend through the openings in the top flaps 37 on side members 12 and 14 to lock the cover panel in its closed position.

The lower tabs 24 are similar in shape and each has a notch or slot 24a along its fold line 26 with the panel 21. The notch is located at the side edge of the tab remote from the fold line 22 and defines a tongue 24b on the tab 24. Preferably, the notch is shaped so that the side edge of the tongue extends obliquely to the fold line 26 of the tab 24. The tabs 24 are arranged to be folded inwardly along the fold lines 26, to extend transverse to the panels 21 and underlie the inside of the adjacent panels 31. In order to facilitate infolding of the tabs 24, during erecting of the box, each of the tabs are preferably cut so that the other side edge 24c thereof extends diagonally to the fold line 26.

The intermediate tab 33 on the panel 31 has a notch or slot 33a formed in the lower side edge thereof and extending along its fold line 34. The notch defines a downwardly extending tongue 33b on the tab 33 and, preferably, the notch is shaped so that the lower edge of the tongue 33b extends obliquely to its fold line 34. The tongue 33 is arranged to be folded along the line 34 to extend transverse to the panel 31 and underlie the inside of the side panel 21, when these panels are in corner forming position. As will be noted, the tongue 33b on the tab 33 and the tongue 24b on the tab 24 extend in relatively opposite directions, when the side panels 21 and 31 are in corner forming position and the space *d* between the base of the notch 33a and the fold line 32 is made substantially equal to the space *d'* between the base of the notch 24a and the fold line 22. The tongues 33b are insertable through the notches 24a by outward flexure of the side panels 31 in the region between the tabs 33 and the fold lines 32. When the side panels 21 and 31 are in corner forming position, the side edges 27 and 35 thereof are disposed in substantially abutting relation and the depending tongue 33b extends behind the tab 24 while the upwardly extending tongue 24b extends behind the tab 33 to firmly lock the panels 21 and 31 in corner forming position.

The tab 33 also has a notch 33c in the upper side edge thereof and extending along its fold line 34 to define an upwardly extending tongue 33d. The notch 33c may also conveniently be shaped so that the upper edge of the tongue 33d extends obliquely to the fold line 34. Each of the upper tabs 23 on the panels 21 have a notch 23a formed in the underside thereof along its fold line

25 with the panel 21, and which notch defines a tongue 23b. The notches 23a are also preferably shaped so that the edge of the tongue 23b extends obliquely to the fold line.

The tab 23 is arranged to be folded along the line 25 to extend transverse to the panel 21 and alongside the adjacent panel 31, when the side panels are in corner forming position. The distance *e* between the notches 33a and 33c is made substantially equal to the distance *e'* between the notches 24a and 23a on the tabs 24 and 23 respectively. The tab 23 is movable through the notch 33c by outward flexure of the panel 21 in the region between the tab 23 and the tab 24, as is shown in FIG. 3. When the upper edges of the panels 21 and 31 are brought into corner forming position, as shown in FIG. 4, the tab 23 underlies the inside of the panel 31 and the tongue 23b thereon engages the inside of the tab 33 while the upwardly extending tongue 33d engages the inside of the tab 23.

After the side panels are erected, the top flaps 37 on the panels 31 are folded inwardly and the top flap 16 on the panel 21 is folded inwardly along the fold line to overlap a portion of the flaps 37 and form a partial cover for the box. The locking tabs 43 on opposite side edges of the cover panel 41 each have a notch or slot 43a in the side edges thereof closest to the side member 13, which notch extends along the fold line 44 of the tab and defines a tongue 43b. A slot or notch 43c is formed along the fold line 44 of the tab 43 to define a tongue 43d on the other end of each of the cover tabs 43. The notch or slot 43c is shaped so as to define a locking edge 43e on the outer end of the tab 43, which locking edge extends preferably parallel to and laterally offset from the fold line 44.

The openings 39 in the top flaps 37 each have one side edge 39a thereof extending along the fold line 38 between the flap and the panel 31. The openings are preferably made relatively wide to facilitate insertion of the tabs 43 on the cover panel thereinto and the opening is advantageously shaped to provide a guide edge 39b which extends obliquely toward the fold line 38. The distance *f* between the opening 39 and the side edge of the panel 31 adjacent the cover 41 is made substantially equal to the distance *f'* between the notch 43a and the fold line 42 of the cover panel. The tongue 43b on the cover tab 43 is insertable through the opening 39 by upward flexure of the cover panel 41 in the region between the tabs 43 and its fold line, as shown in FIG. 4. The other side edge 39c of the opening 39 also extends obliquely to the fold line 38 to guide the tongue 43d on the cover tab 43 toward the fold line 38. The length *g* of the opening 39 is made only slightly greater than the distance *g'* along the fold line 44 between the notches 43a and 43c. A slit 45 is formed in each of the side panels 31 at one end of the opening 39 to permit the tongue 43 on the cover flap to pass therethrough as the cover is moved to its closed position. The slit 45 extends diagonally of the panel 31 in a direction away from the opening 39 and, preferably, is aligned with the inclined edge 39c of the opening so that the edge 39c guides the cover tab 43 into the slit 45. The edge 43e of the tongue 43d is offset slightly below the plane of the panel 41, as best shown in FIG. 5 and is arranged to pass through the slit 45, when the cover is in its fully closed position shown in FIG. 6. The tip of the tongue 43 then moves to the inside of the panel 31 and the edge 43e underlies the top flap 37 to lock the cover in its closed position.

The top flaps 37, when folded down as shown in FIG. 7, form a small radius along their fold line 38 with the side panels 31 and tend to cause the edge of the panels 31 along the openings 39 to arch inwardly. In order to prevent this, a small slit 45a is provided in each of the panels 31 adjacent the end of the openings 39 opposite the slits 45. The slits 45 and 45a permit the portion of the panels 31 along the openings 39 to remain erect when

the flaps 37 are folded inwardly, and thus facilitate insertion of the cover tabs 43.

From the foregoing it is apparent that the box may be rapidly and easily assembled and that the box, when erected forms a rigid enclosure having a smooth outer surface unincumbered by external flaps, tabs, or openings. In erecting the box, the tongues 33b on the side members 12 and 14 are first inserted through the notches 24b on the side members 11 and 13, by flexing the side panels 31 in the region below the tabs thereon, and the tongues 23b on side panels 11 and 13 are thereafter inserted through the slots 33c on the side members 12 and 14, by flexing the panels 21 in the region intermediate the tabs thereon. As is apparent, the tab 33 cannot be withdrawn until the panel 13 is flexed outwardly to release the tab 23 from engagement therewith. This effectively locks the side panels 31 against outward movement. The cover 17 is attached to the upper edge of one of the other side panels 13 and, when locked in its closed position shown in FIG. 6, effectively prevents outward movement of the upper edges of the panel 13. In addition, the cover, when closed, engages the upper ends of the tabs 23 to prevent upward and outward movement of these tabs, as is necessary, to disengage the tabs 23 from the tabs 33.

In the specific form herein illustrated, three interlocking tabs 23, 24 and 33 are illustrated at each corner of the box. It is to be understood, however, that a different number of tabs may be employed and arranged to interlock by flexure of the side panels to which they are attached, without departing from the scope of the present invention.

I claim:

1. An improved corner construction for folding boxes for assembling in corner relationship a bottom panel and first and second wall panels articulated to the bottom panel along fold lines forming an angle, upper and lower tabs articulated to said first wall panel at spaced points along one side edge thereof and adapted to overlie the inside of the second wall panel when the panels are in corner forming position, an intermediate tab articulated to said second wall panel along a side fold line and adapted to overlie the inner face of said first panel intermediate said upper and lower tabs when said panels are in corner forming position, said lower tab having a slot in the upper side edge thereof spaced a first preselected distance from said bottom panel and defining an upwardly extending tongue, said intermediate tab having a slot in the lower side edge defining a downwardly extending tongue spaced less than said first preselected distance from the bottom panel to be insertable through said slot in said lower tab by flexure of said second wall panel between said intermediate tab and the fold line of said second panel with said bottom panel, said intermediate tab having a slot in the upper side edge spaced a second preselected distance from the bottom panel and defining an upwardly extending tongue, and said upper tab having a slot in its lower side edge defining a downwardly extending tongue spaced less than said second preselected distance from the bottom panel to be insertable through the slot in the upper side edge of said intermediate tab by flexure of said second panel between said upper and lower tabs.

2. In a folding box including a first wall panel and second and third wall panels connected to said first panel along relatively perpendicular side edges thereof, said second wall panel having a tab on one side disposed in a plane transverse to said second panel and adapted to underlie the inside of said third panel when said second and third panels are in corner forming relation, said tab having a first slot therein extending along said one side edge of said second panel with the base of said first slot spaced a first preselected distance from said first panel, a tab on one side edge of said third panel disposed in a plane transverse to said third panel and adapted to underlie the inside of said second panel when said second and third

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panels are in corner forming position, said tab on said third panel having a first tongue on one side edge thereof extending toward said first panel and having the end thereof spaced less than said first preselected distance from said first panel to be insertable through said first slot in the tab on the second panel by flexure of said third panel, said tab on said third panel having a second slot in the other side edge thereof defining a second tongue extending along the side edge of said third panel in a direction away from its connection with said first panel and with the base of said second slot spaced a second preselected distance from said first panel, and a tongue on said second panel extending toward its connection to said first panel and spaced therefrom a distance less than said second preselected distance to be insertable through the second slot in the tab on the third panel by flexure of said second panel.

3. In a folding box including a first wall panel and second and third wall panels connected to said first panel along relatively perpendicular side edges thereof, a flap articulated to said second panel along a side fold line and adapted to underlie said third panel when the box is erected, said flap having an elongated opening therein extending along its fold line with said second panel with one end of the opening spaced a preselected distance from said first panel, a tab on one side edge of said third panel disposed in a plane transverse to said third panel and adapted to underlie the inside of said second panel when said second and third panels are in corner forming position, said tab having a first tongue on one side edge thereof extending toward said first panel and spaced therefrom a distance less than said preselected distance to be insertable through said opening in said flap by flexure of said third panel between its fold line and the tab thereon, said first tongue underlying said flap adjacent said one end of the opening when the second and third panels are in corner forming position, said tab having a second tongue on the other side edge thereof extending away from said first panel, said second panel having a slit therein extending obliquely to the fold line of said flap and intersecting the other end of said opening to permit said second tongue on said tab to pass therethrough, said second tongue having a locking edge adapted to underlie said flap when said second and third panels are in corner forming position.

4. The combination of claim 3 wherein the edge of said opening at said other end thereof extends obliquely to its fold line of said flap to guide the tongue on said tab into said slit in the second panel.

5. In a folding box, a bottom panel and first and second wall panels articulated to the bottom panel along fold lines forming an angle, upper and lower tabs articulated to said first wall panel at spaced points along one side edge thereof, an intermediate tab articulated to said second wall panel along one side edge thereof, said intermediate tab on said second panel having upper and lower slots in opposite side edges thereof defining oppositely extending upper and lower tongues, said upper and lower tabs on said first panel having slots in the adjacent side edges defining tongues extending toward each other and terminating with their adjacent ends spaced apart a distance less than the distance between the slots in the intermediate tab on said second panel, the lower tongue on said intermediate tab being insertable through the slot in the lower tab by flexure of the second panel in the region below the intermediate tab, the tongue on the upper tab being insertable through the upper slot in the intermediate tab by flexure of the first panel in region below the upper tab whereby the intermediate tab on said second panel interlocks with the upper and lower tabs on said first panel when said panels are in corner forming position, one of said wall panels having a flap articulated to the upper edge thereof, said flap having an opening therein extending along the fold line of said flap, a cover panel articulated to the upper edge of the other of said wall panels, said cover panel having a locking tab on the

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side edge thereof, a first tongue on one end of said locking tab insertable through said opening in said flap by flexure of said cover panel between its fold line and said locking tab, and a second tongue on the other end of said locking tab, said one of said wall panels having a slit therein intersecting its fold line and extending diagonally away from said opening in said flap to permit said second tongue on the locking tab to pass therethrough, said second tongue on the locking tab having a locking edge adapted to underlie said flap when said cover panel is closed.

6. The combination of claim 5 wherein one edge of said opening extends obliquely to the fold line of said flap and merges with said slit in the wall panel to guide the second tongue on the locking tab thereinto.

7. An improved corner construction for folding boxes for assembling in corner relationship a bottom panel and first and second wall panels articulated to the bottom panel along fold lines forming an angle, upper and lower tabs articulated to said first panel at spaced points along one side edge thereof and adapted to overlie the inside of the second wall panel when said panels are in corner forming position, an intermediate tab articulated to said second wall panel along one side edge thereof and adapted to overlie the inside of said first panel at a point intermediate said upper and lower tabs when said panels are in corner forming position, said intermediate tab on said second panel having upper and lower V-shaped notches in opposite side edges thereof defining oppositely extending upper and lower tongues, said upper and lower tabs on said said first panel having V-shaped notches in the adjacent side edges defining tongues extending toward each other and terminating with their adjacent ends spaced apart a distance less than the distance between the notches in the intermediate tab on said second panel, said lower tongue on the intermediate tab being insertable through the notch in the lower tab by flexure of the second panel in the region below the intermediate tab, the tongue on the upper tab being insertable through the upper notch in the intermediate tab by flexure of the first panel in the region below the upper tab whereby the tab on said second panel interlocks with the pair of tabs on said first panel when the wall panels are in corner forming position.

8. An improved corner construction for folding boxes comprising a bottom panel and first and second wall panels articulated to the bottom panel along fold lines forming an angle, a first tab articulated to said first panel along a side edge thereof, said first tab having an upwardly extending tongue on the upper edge defining a notch between said tongue and said side edge of the first panel, a second tab articulated to said second panel along a side edge thereof and having a downwardly extending tongue, said second tongue being insertable through said notch by flexure of said second panel in the portion thereof below said second tab, a cover articulated to the upper edge of one of said wall panels, a tab articulated to the side edge of said cover, and a flap on the other of said wall panels having an opening therein for receiving said tab on the cover, the upper end of said second tab engaging said cover when said cover is closed to prevent withdrawal of said second tab.

9. An improved corner construction for folding boxes for assembling in corner relationship a bottom panel and first and second wall panels articulated to said bottom panel along fold lines forming an angle, a first tab articulated to one side edge of said first panel and extending transverse thereto to overlie the inside of the second panel when the panels are in corner forming position, said first tab having an upwardly extending tongue defining a slot with the adjacent side edge of said first panel, a second tab articulated to one side edge of said second panel and having a downwardly extending tongue on its lower end and an upwardly extending tongue on its upper end defining an upper slot with the adjacent side edge of the second panel, the lower edge of said second tab at its

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juncture with the side edge of said second panel being spaced above said bottom panel a distance substantially equal to the spacing between the upper edge of said first tab at its juncture with the side edge of said first panel whereby said lower tongue on the second tab is insertable through the slot on the first tab by lateral flexure of the second panel, a third tab on said one side edge of said first panel having a downwardly extending tongue on its lower end, the lower edge of said third tab at its juncture with the side edge of said first panel being spaced above the bottom panel a distance substantially equal to the spacing between the upper edge of said second tab at its

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juncture with the side edge of said second panel whereby the third tab is insertable through the upper slot in said second tab by flexure of said first panel.

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