Sept. 8, 1942. R. W. HOAG 2,295,515

FOLDING BOX

Filed June 6, 1939 3 Sheets-Sheet 1

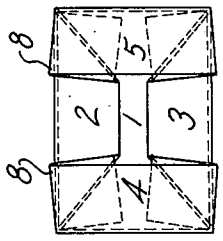


Fig. 4

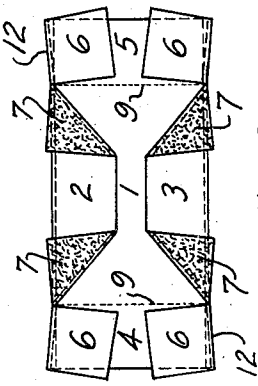


Fig. 3

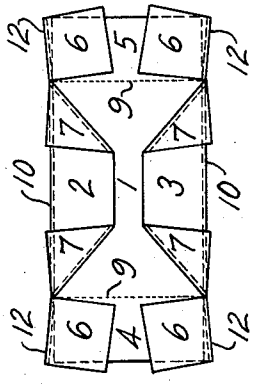


Fig. 2

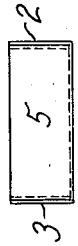


Fig. 7

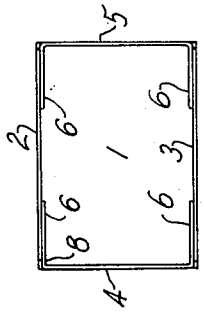


Fig. 5

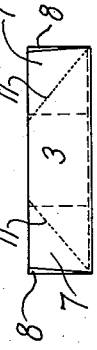


Fig. 6

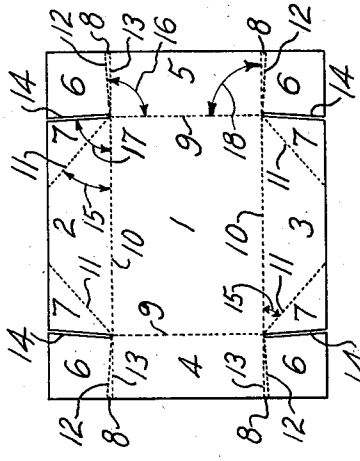


Fig. 1

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FOLDING BOX

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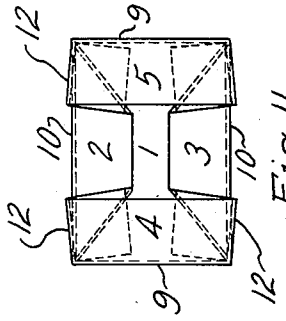


Fig. 11

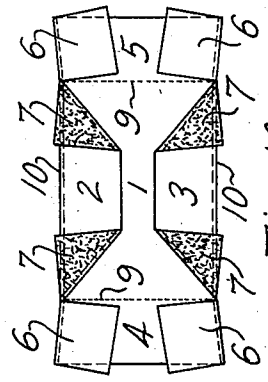


Fig. 10

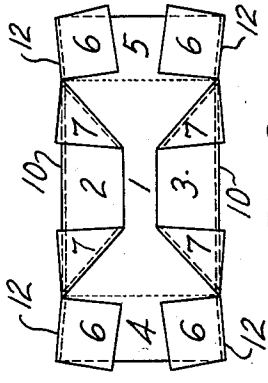


Fig. 9

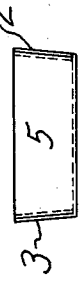


Fig. 14

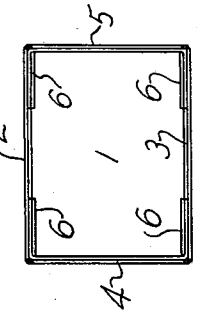


Fig. 12



Fig. 13

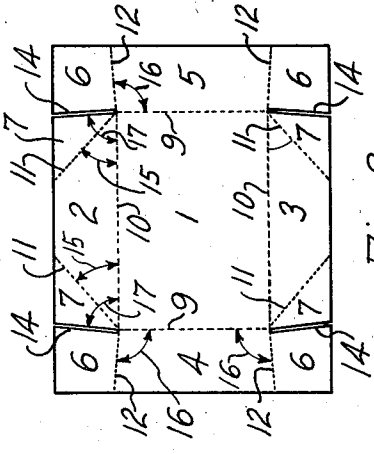


Fig. 8

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FOLDING BOX

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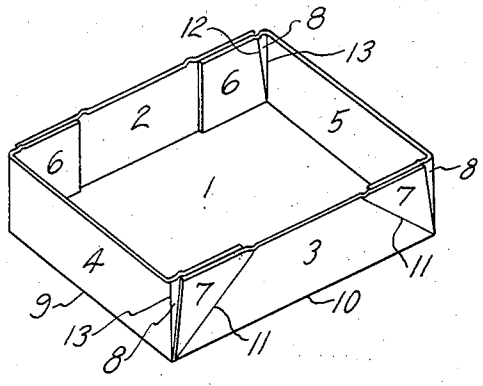


Fig. 15

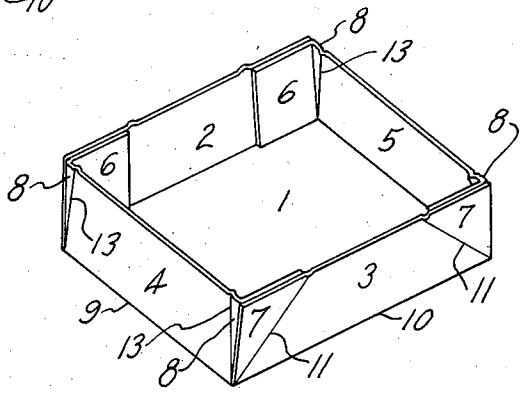


Fig. 16

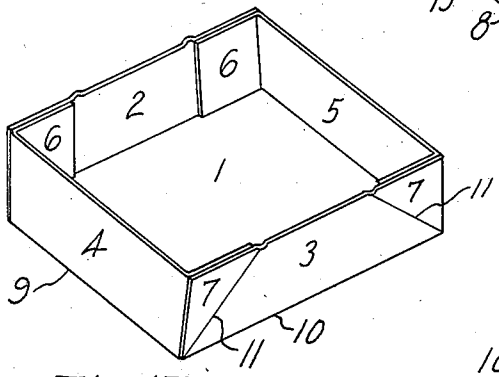


Fig. 17

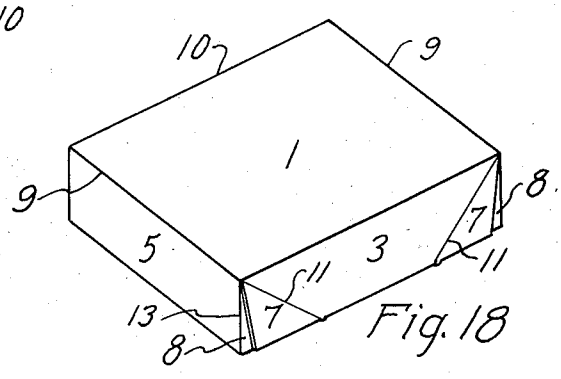


Fig. 18

Inventor

Roderick W. Hoag

Patented Sept. 8, 1942 2,295,515

UNITED STATES PATENT OFFICE

2,295,515

FOLDING BOX

Roderick W. Hoag, Melrose, Mass., assignor to Harlow M. Russell and Melvin H. Sidebotham, copartners doing business as Russell & Sidebotham, Melrose, Mass.

Application June 6, 1939, Serial No. 277,643

5 Claims. (Cl. 229—32)

The invention relates to improvements in folding boxes of the type which automatically retain the walls thereof in upright position upon being brought to such position.

One object of this invention is to provide a folding box of the character described, having at each corner a flap, an edge of which frictionally engages the bottom section of the box to hold the box walls in upright position with respect to the bottom section of the box.

Another and important object of this invention is to provide an improved box blank having wall retaining elements integral with the end walls.

With said objects in view, and others hereinafter explained, my invention consists of the folding box substantially as hereinafter described and claimed.

Of the accompanying drawings:

Figure 1 is a plan view of the blank from which my improved box may be formed.

Figure 2 is a plan view of the blank showing the condition thereof after folding operations have been performed on opposite side margins.

Figure 3 is the same as Figure 2 except that areas are shown to which adhesive may be applied in the method of making the box.

Figure 4 is a plan view of the completed box in collapsed condition after the folding operations have been completed.

Figure 5 is a plan view of the box in set-up condition.

Figure 6 is an elevation of the box showing one of the side walls.

Figure 7 is an end elevation of the box in set-up condition.

Figures 8 to 14 inclusive and Figure 17, illustrate a modified embodiment of my invention, wherein the end walls converge inwardly when the box is set up, while the side walls diverge outwardly with relation to the bottom section.

Figure 8 is the same as Figure 1 except that certain creased lines are omitted.

Figures 9, 10 and 11 illustrate the progressive steps of the method of making a paper box from the prepared blank shown in Figure 8.

Figure 12 is a plan view of the modified form of box in set-up condition.

Figure 13 is a side elevation of the box shown in Figure 12.

Figure 14 is an end elevation of the box shown in Figure 12.

Figure 15 is a perspective view of the box shown in Figures 5, 6 and 7, tilted so as to show a portion of the interior thereof.

Figure 16 is similar to Figure 15 except that creased line 12, instead of creased line 13, is at the corner of the box.

Figure 17 is a perspective view of the box shown in Figures 12, 13 and 14, tilted so as to show a portion of the interior thereof.

Figure 18 is a perspective view of a box cover made in the same manner as the box shown in Figures 1 to 7 inclusive.

Referring to Figure 1, there is illustrated a cut and scored blank of suitable material such as paper box board, creased lines being represented by dotted lines 9, 10, 11, 12, and 13, and cut lines represented by full lines 14. The said creased lines and cut lines effect a division of the blank to form a bottom 1 for the box, side walls 2 and 3, end wall sections 4 and 5, corner segments 8, wall retaining flaps 6, and side wall folding elements 7.

After the blank has been cut and creased as above described, the wall retaining flaps 6 are folded on creased lines 12 to lie against the corresponding end walls 4 and 5. The side walls 2 and 3 are folded on lines 10 to lie against the bottom section of the box, and the side wall folding elements 7 are doubled against the corresponding side walls as illustrated by Figure 2. Adhesive is then applied to the side wall folding elements 7 as shown by Figure 3. The end walls 4 and 5 are thereafter folded on creased lines 9 causing the wall retaining flaps 6 to contact the corresponding side wall folding elements 7, thus becoming adhesively secured thereto. Figure 4 illustrates the box in completed flat folded condition ready to be set up for use.

When it is desired to set up the box produced by the method just described, the side walls 2 and 3 (Fig. 4) are simply raised and bent outwardly, whereupon each wall retaining flap 6 will automatically unfold to lie against the corresponding side wall. The bottom edge of each retaining flap 6 in taking its upright position will be drawn across the bottom section 1 of the box causing a frictional engagement which serves to hold the side falls in upright position when the box is set up. It will be noted that the perimeter of the opening of the box will be equal to the perimeter of the bottom section of the box. If it is desired to have the walls of the box at precisely 90° with relation to the bottom section, as illustrated by Figure 15, it will be necessary to manipulate each corner of the box so that the creased line 13, instead of creased line 12, will be at the corner of the box. In cases where the box is provided with a cover which is made exactly the same as the box, ex-

cept that certain dimensions are increased, the walls of the box and the cover will be drawn to extend at precisely 90° with relation to the bottom section of the box due to the action of pressing the cover down over the walls of the box. In fitting the cover to the box, it will be obvious that as the cover is pressed downwardly the end walls of the cover will be forced outwardly, thus changing the corner from creased line 12 to creased line 13. Conversely the action of pressing the cover downward upon the box will force the side walls of the box inwardly and the end walls of the box outwardly, with the result that the corner of the box is changed from creased line 12 to creased line 13.

In the method of producing the box, a rectangular shaped blank is first creased and cut to provide the box elements above described. It is necessary, however, that certain of the creased lines and the cuts be carefully fashioned so that when the folding operations are performed there will be no damage done to the wall retaining flaps 6 which must remain in flat condition so that when the box is set up there will be proper frictional engagement between the bottom section of the box and the lower edge of said wall retaining flaps. Creased lines 10 (Figs. 1 and 8) are parallel with each other and parallel with the side edges of the blank. Creased lines 9 are at right angles to the sides of the blank and parallel with each other and they are also parallel with the end edges of the blank. The creased lines 13 (Fig. 1) are parallel with the creased lines 10. The creased lines 12, however, are at an angle 16 (Figs. 1 and 8) with relation to creased lines 9, said angle being somewhat greater than 90°. The creased lines 11 are each at an angle 15 with relation to creased lines 10, this angle being somewhat less than 45°. The cuts 14 are at an angle 17 which is somewhat less than 90° with relation to lines 10.

In practice, for certain sizes of boxes it will be found that favorable results will be obtained by having creased lines 11 at an angle of 43½° with relation to lines 10, creased lines 12 at an angle of 91½° with relation to lines 9, and cuts 14 at an angle of 88½° with relation to lines 10. It should be understood, however, that there are a number of factors that must be considered in order to determine just the right angles to use. The depth of the box and the thickness and stiffness of the blank material determine, to a great extent, the exact angles to use to obtain the best results. It is desirable in many cases to remove small areas of the blank adjacent to the cut lines 14, so that the wall retaining flaps 6 will lie close against the side walls, when the box is set up.

The construction and the method of making the box illustrated in Figures 8 to 14 inclusive and Figures 17 is a modified form of my invention. Figure 8 is the same as Figure 1 except that creased lines 13 shown in Figure 1 are omitted from the blank shown in Figure 8. All other features of the blank shown in Figure 8 are exactly the same as those of the blank shown in Figure 1. The method of fabricating this embodiment is the same as that shown in Figures 1 to 7 inclusive, except that creased line 12 is at each corner of the box instead of creased line 13. In other words, in the preferred embodiment of my invention, the box is manipulated, when erecting the same, to bring the creased lines 13, instead of creased lines 12, to lie at the precise corners of the box.

While I have illustrated and described the preferred forms of construction and the preferred method for carrying my invention into effect, these are capable of variation and modification, without departing from the spirit of the invention.

I have shown the cut lines 14 (Figs. 1 and 8) as the preferred form of cuts to be provided in the blanks, but the cuts may be varied without departing from my invention. Said cuts may be in the form of slots having straight sides, or they may be V-shaped. The creased lines 12 and 13 shown in Figure 1 may be in the form of one V-shaped crease, or a series of creases forming a fan-crease.

Instead of applying adhesive to the side wall folding elements 7 (Figs. 3 and 10), the adhesive may be applied to corresponding areas of the wall retaining flaps 6.

Having described my invention, what I claim is:

1. A rectangular blank for paper boxes having creased lines and cuts fashioned therein, comprising, a pair of creased lines extending longitudinally the length of the blank and being parallel with the side edges of the blank; a pair of transversely creased lines connecting intermediate points of the longitudinally creased lines and being parallel with the end edges of the blank, thus providing a bottom, a pair of end walls and a pair of side margins, said side margins each being provided with two outwardly converging cuts, each cut extending from the junction point of the transversely and longitudinally creased lines to the corresponding side edge of the blank; said cuts effecting a division of the side margins to provide side walls crease-hinged to opposite sides of the bottom, the end portions of the side margins being crease-hinged to the end walls and being wider at the outer edges than at the crease-hinged edges; creased lines radiating from each corner of the bottom lie at an angle slightly less than forty-five degrees from the sides of the bottom across each side wall; each end portion of the side margins being intersected by a creased line extending from a corner of the bottom to the corresponding end edge of the blank and lying close to the corresponding creased line extending longitudinally the length of the blank, effecting a division of each end portion of the side margins to form a corner segment and a wall retaining flap at each corner of the blank.

2. A rectangular blank for paper boxes having creased lines and cuts fashioned therein comprising, a pair of creased lines extending longitudinally of the blank and being parallel with the side edges of the blank; a pair of transversely creased lines connecting the longitudinally creased lines and being parallel with the end edges of the blank, thus providing a bottom, a pair of end walls and a pair of side margins; each side margin having therein two outwardly converging cuts, each cut extending from the junction point of the transversely and longitudinally creased lines to the corresponding side edge of the blank; said cuts divide the side margins to provide side walls crease-hinged to opposite sides of the bottom, and side margin end portions crease-hinged to the end walls and being wider at the outer edges than at the crease-hinged edges; creased lines radiating from each corner of the bottom lie at an angle slightly less than forty-five degrees from the sides of the bottom across each side wall; and a creased line extending across each side margin

end portion from a corner of the bottom to the corresponding end edge of the blank and lying close to the corresponding creased line extending longitudinally the length of the blank.

3. A rectangular blank for folding paper boxes having creased lines and cuts therein which effect a division of the blank to form a rectangular bottom, a pair of side walls crease-hinged to opposite sides of the bottom, each side wall being crossed by two creased lines each line radiating from a corner of the bottom and lying at an angle of less than 45 degrees from the corresponding side of the bottom; a pair of end walls crease-hinged to opposite ends of the bottom, triangular shaped corner segments crease-hinged to opposite sides of each end wall section, and a quadrilateral shaped wall retaining flap crease-hinged to each corner segment on a side of the corner segment radiating from the corresponding corner of the bottom.

4. A folding wall box comprising, a bottom, upright side walls and end walls, each side wall being intersected by two creased lines each line radiating from a corner of the bottom and extending at an angle of less than forty-five degrees from the bottom edge of the side wall, the said end walls each having a triangular shaped corner segment crease-hinged to its opposite sides, and a quadrilateral shaped wall retaining flap crease-hinged to each corner segment on a side of the corner segment radiating from the corresponding corner of the bottom and being secured to the inside surface of the corresponding side wall, the box when erected having a perimeter at the opening equal to the perimeter of the bottom.

5. A folding wall box comprising, a bottom, side walls and end walls; each side wall being intersected by two creased lines radiating from corresponding corners of the bottom and each creased line extending at an angle of less than forty-five degrees from the bottom edge of the side wall; the said end walls each comprising a rectangular mid-area having triangular corner segments at the ends thereof; and quadrilateral shaped wall retaining flaps crease-hinged to each corner segment on a line radiating from the corresponding corner of the bottom and being secured to the inside surface of the corresponding side wall, the box when erected having a perimeter at the opening equal to the perimeter at the bottom.

RODERICK WM. HOAG.