Aug. 6, 1940. S. BERGSTEIN 2,210,443

BOX WITH LID ATTACHED AND METHOD OF MAKING THE SAME

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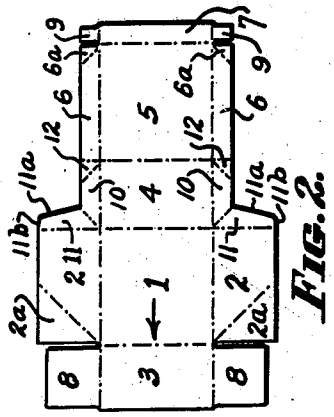

FIG. 2.

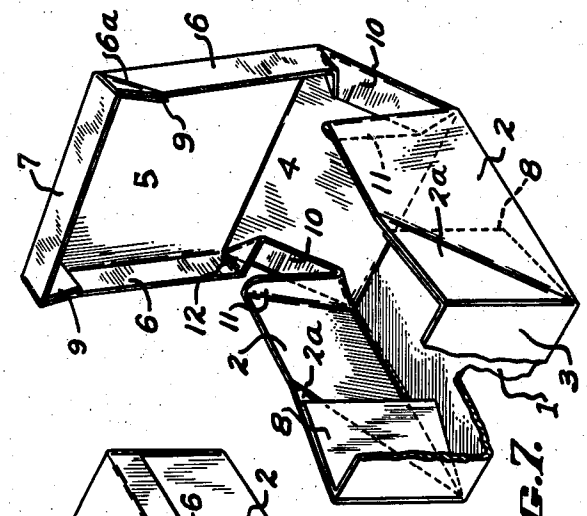

FIG. 7.

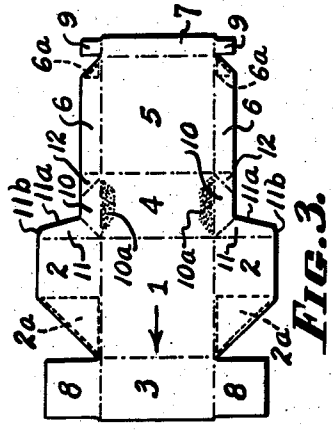

FIG. 3.

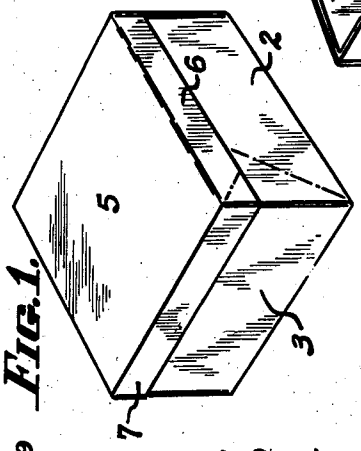

FIG. 1.

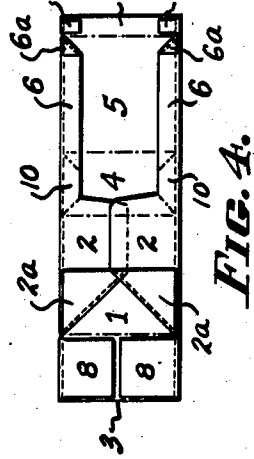

FIG. 4.

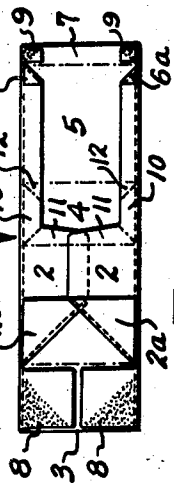

FIG. 5.

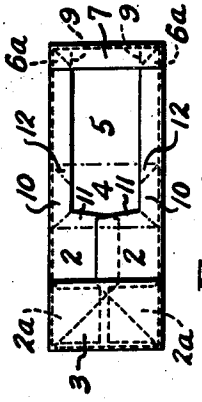

FIG. 6.

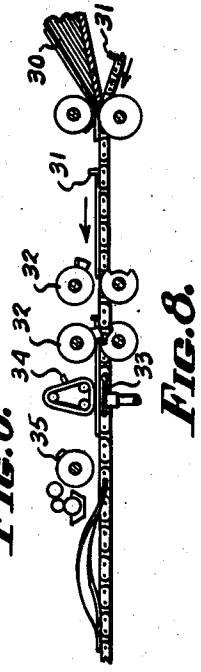

FIG. 8.

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FIG. 9.

FIG. 10.

FIG. 11.

FIG. 12.

FIG. 15.

FIG. 13.

FIG. 14.

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Patented Aug. 6, 1940

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UNITED STATES PATENT OFFICE

2,210,443

BOX WITH LID ATTACHED AND METHOD OF MAKING THE SAME

Samuel Bergstein, Cincinnati, Ohio, assignor, by mesne assignments, to Robert Morris Bergstein, Cincinnati, Ohio, and Frank David Bergstein, trustees

Application October 7, 1937, Serial No. 167,788

2 Claims. (Cl. 229—33)

My invention relates to a one piece type of box with cover attached, which can be shipped flat or in knocked-down form, and can be erected readily for packing by the user. It is an object of my invention to produce a box of the character noted, which will provide both a bottom and lid having front and side walls, said walls being joined at corners where they meet, the back wall having at its lateral edges intermediate corner-connecting sections between the side walls of both the bottom and the lid, which intermediate corner-connecting sections are caused to adhere to the said back wall and are provided with diagonal fold portions which are left free and are connected respectively to the side walls of both the lid and the bottom so as to permit ready erection of the said side walls. It is one of my objects to so arrange the dimensions and outline of the blank structure that in the cutting thereof there is a considerable saving on paper board when I employ a shallower lid than bottom. A structure such as has now been briefly described can be very easily erected since the act of raising the side walls of the knocked-down structure will result in raising the back walls. My invention is further well adapted for the style of box in which panels on the front walls can be secured to reversely folded diagonal portions of the side walls at the corners of the structure, thus providing for stiffness of the side walls when the same is erected, either with the intermediate corner-connecting sections adhered to the back wall, or not.

I have illustrated several forms in which my invention is embodied in the accompanying drawings, but without intent thereby to limit the application of the invention to such forms alone, and I refer to the appended claims as stating the invention inherent in my disclosure.

In the drawings:

Figure 1 is a perspective of a box of my preferred form.

Figures 2, 3, 4, 5 and 6 show in plan view the several stages whereby the forming of the box in knocked-down condition can be accomplished by automatic machine folding operations.

Figure 7 is a perspective view partly broken away showing the operation of erecting the box of this preferred form.

Figure 8 is a diagram showing the initial mechanism for use in automatic folding operations.

Figures 9, 10, 11 and 12 show stages in the operations of forming a box which embodies my invention but lacks some of the advantages of the preferred form initially illustrated.

Figure 13 is a perspective showing the erection of this second form of box.

Figure 14 shows a blank such as is illustrated in Figure 2, but in which the lid and bottom portion have sides of equal depth.

Figure 15 is a plan view showing the mode of cutting the box blanks from a piece of paper board without waste so as to effect a saving of practically all of the board not used because of the lid being shallower than the main box portion or bottom.

The structure of the first or preferred form of my invention can be manufactured by the mechanism and methods described in my Patents No. 1,926,364, issued September 12, 1933, and No. 1,974,408, issued September 15, 1934, and as disclosed in my co-pending application Serial No. 129,900, filed March 9, 1937, by the addition of a pair of timed glue wheels to the mechanism that carries the blank in the initial direction of motion, as will be more fully noted below.

Referring now to the drawings and the first or preferred form illustrated therein, I show a box blank having a main bottom panel 1, having side panels 2, 2, a wall 3 which for convenience will be called a front wall, and a wall 4 which for convenience will be called a back wall. Articulated to this back wall is the main body panel 5 of the lid, said lid having side walls 6, 6, and a lid front wall 7.

Extending laterally from the front wall panel of the box bottom portion are the corner sustaining flaps 8, 8, and like corner sustaining flaps 9, 9, extend laterally from the lid front wall panel. The side panels 2, 2, have diagonally scored portions 2a, and the side panels 6, 6, have like portions 6a, 6a.

Between the side wall panels of the lid and bottom portions of the blank are intermediate corner connecting sections having diagonal lines of fold therein. They may be described as having a median portion 10, with triangular sections 11, 11 and 12, 12 articulated by diagonal fold lines to the median portion and to the respective side walls by a fold line normal to their length.

In this particular form of blank the sections 11, 11 are shaped to permit of cutting the blanks from a sheet without waste of the board which is not used due to the shallowness of the lid sections. My arrangement avoids staggering of the blanks when cutting them from a sheet, thus saving end wastage and avoids loss of any board due to the narrower lids and wider bottoms being cut from the sheets as one piece. Thus the sections 11, 11 extend from the outer end of the diagonal

fold line adjacent to the main portion or bottom portion of the box, on a slanting line 11*a*, and thence on a line 11*b* which is an extension of the boundary of the side wall panels 2.

Thus, as shown in Figure 15, the blanks can be cut from a sheet with the trapezoids 11, 11 staggered, but the remainder of the blanks merely shifted end for end, with no waste whatever, and with a saving of all of the board not used in making the shallow lid sections. A further advantage is that the intermediate corner connecting sections are cut on a bias in a manner to provide a maximum area of material for each adjoining blank.

Referring now to the formation of the box adapted for automatic machine operation, as well as hand operation, the first stage as shown in Figure 3 is to fold the diagonally scored sections 2*a*, 2*a* and 6*a*, 6*a* back against the under side of the blank. During the same stage adhesive will be applied as at 10*a*, 10*a* to the back wall 4, or to the portions 10 of the corner sections or both. Then in the next stage, as shown in Figure 4, the side panels along the entire structure are folded inwardly thus causing the portions 10, 10 to adhere to the back wall, and bringing the underturned sections 2*a*, and 6*a*, uppermost.

In automatic machinery it will then be best to change the direction of movement of the blank as indicated in Figure 5, whereupon adhesive will be applied to the inturned flaps 8, 8 and 9, 9 which flaps I have termed the corner sustaining flaps, as indicated in Figure 5. The final operation will be to turn the respective front panels, now lying at the sides of the blank, inwardly over the remainder thereof, which results in causing the adherence of the sustaining flaps to the triangular portions 2*a*, and 6*a*.

The knocked-down structure is now complete and can be stacked in an ordinary set of stacking belts, while the adhesive becomes set, and permitting the removal of a stack of blanks at a time for placing in shipping packages

The erection of the box is illustrated in Figure 7. The first operation is to lift the sides of the main or bottom portion and of the lid. This will swing the sustaining flaps into position against the bottom of the main portion and will hold the side walls in their erected position. The act of lifting the sides also serves to swing inwardly the sections 11 and 12, since the sections 10 of the corner portions are held against the back wall 4, an operation which swings up the back wall. The box is then ready for filling after which the lid is ready for closure by raising the lid side walls and placing the opened lid over the bottom.

It will be noted that the box as described above can also be utilized without the adherence of the intermediate connecting corner sections to the back wall.

The closed box is illustrated in Figure 1, and will be very strong against collapse, having four corner sustaining flaps and having both side and end walls of the lid engaging over the side walls and front wall of the box, and having a back wall reenforced by the adhering portions 10 of the connecting portions between the lid and the rest of the box.

In Figure 14 is shown a box in which the lid has the same depth as the box. In this form I have numbered the parts in the same manner as in the first form shown. It will be noted that the sections 10, 10 come to a point, instead of having any lengthwise dimension intermediate the ends of the diagonal fold lines.

In Figures 9 to 12, inclusive, is shown a structure in which there are no corner sustaining flaps and the diagonal scores permitting collapse of the box and the forming of the same in knock-down condition are located in the ends of the blank.

In this form I have illustrated the panels of the lid and of the main box portion or bottom, at 20 and 21, respectively, the side walls of the lid and bottom at 22 and 23, respectively, the flaps at the front walls 24 and 25 of the lid and bottom being indicated at 26 and 27, and the diagonal scores at 28 and 29 in the said two front walls.

In this form I have illustrated the intermediate corner connecting sections at each side of the blank with the same numerals as in the first form because they are the same. Thus in this blank there are the said corner sections having the portion 10, 11 and 12 at each side of the main back walls 4.

In forming this box, the first operation is to fold the front walls of the bottom and lid on the diagonal scores to the position indicated at 28*a* and 29*a* for the two portions respectively in Figure 10. Then the adhesive is applied on the turned-in flaps 26 and 27, and also at the back wall 4, at the areas 10*a* as in the first instance. The final operation is to turn the sides of the complete blank inwardly causing the several portions with adhesive between them to adhere together. The completed box is delivered in knock-down form for shipment, and as shown in Figure 13, can be erected as in the first instance, with the exception that there are no corner sustaining flaps which require some manipulation of the box in order to keep the front walls of the bottom and the lid erect and prevent the box from collapsing during filling. When closed the box of this form will be quite rigid and self-sustaining against collapse.

Referring for a moment to Figure 8, I have shown the mechanism in diagram which can be used for forming the box of my first form.

The blanks from a stack 30 are delivered to a conveyor having studs 31 thereon, which causes them to pass between flap deflecting wheels 32, 32 which turn down the corners diagonally connected with the side wall portions at the forward and rearward ends of the blank. Sweeps 33 assisted by positive deflectors 34, complete the turning under of the said diagonal portions. I have indicated an adhesive-applying device 35 for applying the adhesive at the spots 10*a*.

After passing the adhesive-applying devices, the next operation is to turn in the entire sides throughout the blank on both lateral edges thereof, resulting in the adherence of the portions 10 to the back wall of the structure, and in the second illustrated form completing the box, additional gluing and folding devices being required for the first form accompanied by change in orientation of the blank to the line of feeding position.

It can be noted from the above that the addition of a single application of adhesive, is the only difference in the operations of forming the box with attached lid, over the operations of forming a box without a lid but having the front and rear ends corresponding to each other. In my new form the front wall of the lid is formed by the mechanism or in the manner in which the rear wall of a box without a lid is formed, and all that is required is to retime the folding devices and respace them, which is incident to machines used industrially for making different sized boxes without the lids.

In the claims that follow, the word "bottom" is used to refer to the four walled box section, and "lid," to the lid section having side walls, at least.

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

1. A one-piece box with lid in knock-down form, comprising a bottom and a lid, the lid being hinged to the back wall of the bottom, and intermediate sections connecting the back wall and the side walls of the bottom and lid, and the side walls and front walls of the lid being of substantially less depth than those of the bottom, and the intermediate sections being so shaped as to permit of staggering said sections in blanks for said boxes turned end for end and arranged side by side for the purpose described.

2. A blank suitable for forming into a one piece knocked-down box with lid attached, comprising a main bottom panel with a front wall, two side walls and a back wall attached thereto, and attached to said back wall a main lid panel having a front wall and two side walls, there being intermediate sections with diagonal lines of fold therein connecting said back wall and said lid and bottom side walls, the walls of the bottom being of greater height than the walls of the lid, and the said intermediate sections being cut on a bias, the ends of which bias-cut are defined substantially by the respective heights of said bottom and lid side walls.

SAMUEL BERGSTEIN.