

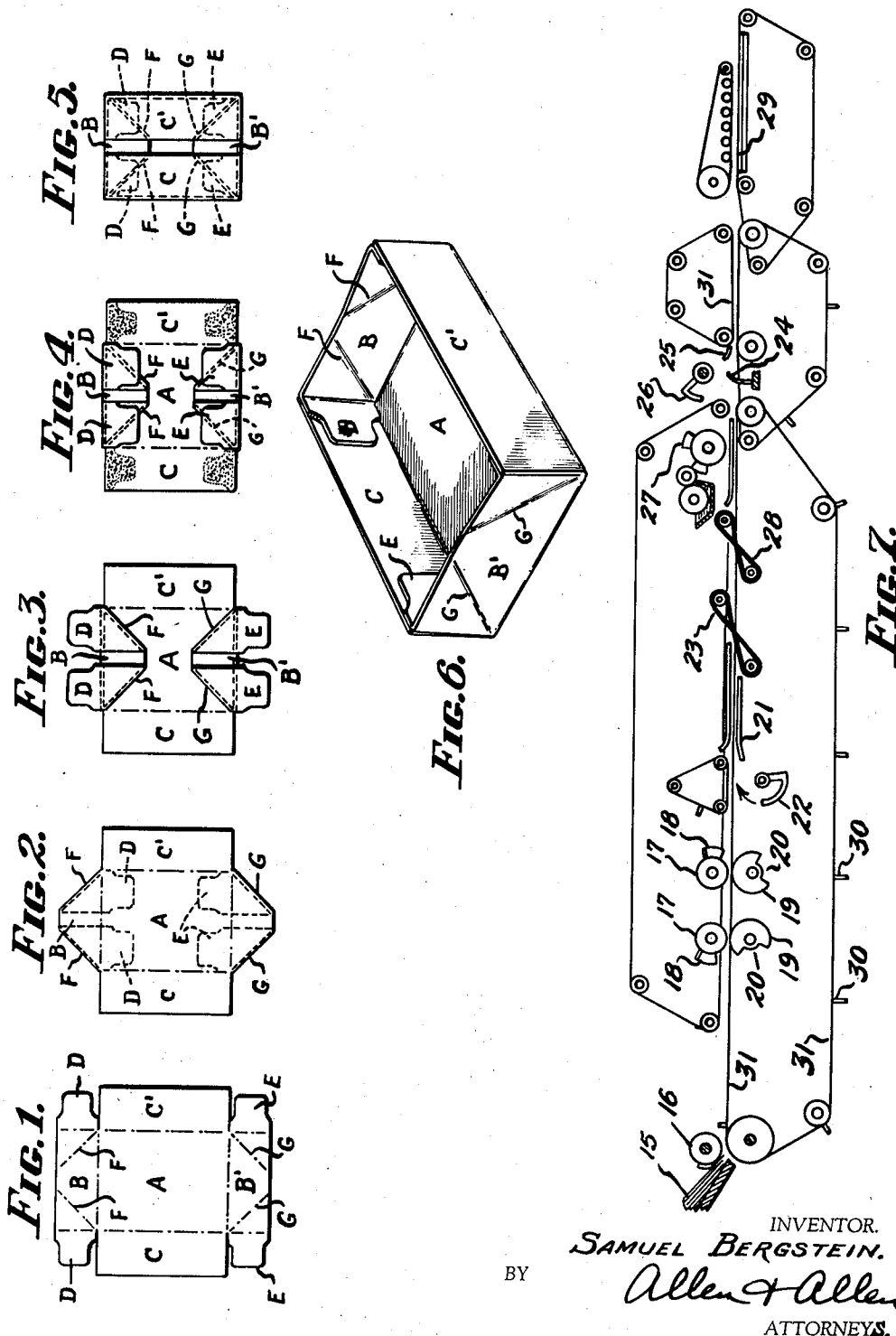
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METHOD OF MAKING INFOLDED KNOCKDOWN BOXES

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METHOD OF MAKING INFOLDED KNOCK-DOWN BOXES

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6 Claims. (Cl. 93—49)

This application is a continuation in part of my copending application, Serial No. 236,691, filed October 24, 1938, and entitled Method of making infolded knockdown boxes.

In the field of what is known as collapsible or knockdown boxes, adapted to ready erection, one of the types in most widespread use at the present time is made with one pair of opposite walls folded inwardly, and the remaining pair of opposite walls folded outwardly. When such a box is squared up for use, the outwardly folded walls retain their tendency to flare outwardly, making a box that is difficult to pack efficiently, and one which is not neat in its finished appearance. For this reason, it has become a common practice among producers of such boxes, to refold the boxes inwardly prior to shipping them to the user, which is an additional and expensive hand operation. However, in such infolded boxes, due to the fact that the diagonal fold line has been folded first outwardly and then inwardly, the result is to produce a rather flimsy box, and it does not have a sufficient inward tendency to grip the contents placed therein securely.

There are other methods in use, to produce boxes in flat or knockdown form, having both the sides and ends folded inwardly, but most of these involve either first gluing up the box blank in erect or upright form, and thereafter collapsing it, which process does not lend itself to high-speed production, or by the use of complex mechanisms which convey the box in two or more positions relative to its direction of motion.

My invention as herein disclosed, I provide a method for making knockdown boxes, with all sides folded inwardly, and with the diagonal creases having been folded in one direction only, providing thereby a box which when erected does not have any tendency to bulge or flare outwardly, and this is one of the objects of my invention. Further, by my process, the folding and gluing operation can be carried out by comparatively simple high-speed mechanism, conveying the box in one position relative to its direction of motion, and which also may be carried out efficiently by hand or other means if desired. Further, by my invention I am able to produce such a knockdown box wherein there are no crevices or pinholes in the corners, providing a leak-tight condition, which is a still further object of my invention.

These and other objects of my invention will become apparent as the description proceeds.

In the drawing:

Figure 1 illustrates my preferred blank in flat form.

Figs. 2, 3, 4 and 5 illustrate respectively the first, second, third and last stages of the folding operation.

Fig. 6 is a perspective of the box in open position, and

Fig. 7 is a diagrammatical illustration of one type of mechanism suitable for carrying out my process.

Referring now to the drawings, the blank shown in Figure 1 has a main body panel A, side walls C and C', and end walls B and B'. In these end walls are located respectively lines of diagonal fold F—F and G—G. Articulated to the edges of the end panel B are end flaps D—D, and articulated to the edges of end wall B' are corner flaps E—E, as illustrated.

In passing it should be noted that the use of the terms "end walls" and "side walls" is for convenience only, the pair of opposite walls having diagonal lines of fold therein, with corner flaps articulated thereto, being designated as "end walls", and the remaining pair of opposite walls being designated as "side walls", for the purposes of clarity in description, and without reference to the relative dimension of said walls.

Referring now to Figure 2, the first stage of my method is to fold reversely along the diagonal lines F—F and G—G, bringing the triangular portions of the end walls defined by these diagonal lines, as well as the corner flaps, into position underlying the blank as shown.

The next step, as illustrated in Figure 3, is to fold in the end walls B and B', into position overlying the main body panel, the previously folded portions being retained in folded position.

After the blank has been folded into the position illustrated in Figure 3, the next stage according to my present process is to fold inwardly the corner flaps, as illustrated in Figure 4. With all folded portions being retained in folded condition, the opposite side walls C and C' are thereupon folded inwardly to overlie the previously infolded corner flaps, adhesive having been introduced between the meeting surfaces of the corner flaps and the side walls. This brings the box into the position shown in Figure 5, and after adhesion has been secured by means of pressure or other means, the box as shown erected or set up in Figure 6 is ready for use.

In Figure 7 I have illustrated diagrammatically a mechanism suitable for carrying out the folding and gluing according to my method as illustrated by Figures 1 through 5. The machine

as illustrated consists of a timed feed mechanism, timed score breakers and twist belts, a front spring guide, timed kicker, an overhead guide continuing to act as a hold down for the folded walls, timed glue wheel, and a stacking conveyor.

The blanks are placed in a hopper 15, from which they are withdrawn one at a time by the feed wheel 16, the direction of motion of the blank being parallel to the end walls. The blanks can be fed through the machine in timed relation by means of spaced pins 30 on a chain 31 as shown.

As the blanks begin their advance through the machine there are four pairs of score breakers, each pair consisting of an overhead wheel 17 having a fin or rib 18 thereon located at an angle, and an underneath wheel 19 having a pocket 20 therein, these wheels operating in timed relation to the travel of the blank, and each pair of wheels or score breakers serving to fold downwardly the triangular portion of the end panels, with the corner flaps articulated thereto, along the diagonal lines of fold F and G.

The folding of the advancing pair of corner flaps is completed by a guide plate 21, and the folding of the rearward or trailing pair of corner flaps is effected by timed sweeps 22, which serve to complete the folding along the diagonal lines initiated by the score breakers, bringing the blank into folded position illustrated by Figure 2.

By means of guides the folded condition is retained and as the blank continues to advance, twist belts 23 serve to fold the end walls inwardly, thereby bringing the blank into position shown in Figure 3.

Thereupon twist belts 28 operate to fold the corner flaps inwardly to the position of Figure 4.

With all folds now being retained in folded condition, the blank passes beneath glue wheels 27 as illustrated, which deposit adhesive upon the extending corner flaps, or to the corresponding portion of the side wall panels.

As the blank now continues through the machine, the forward or advancing side wall C¹ comes into contact with the spring guide 24, located so as to press upwardly on the forward wall, and the folding of the forward wall is completed by stationary overhead guide 25 which the continued travel of the blank serves to bring the forward wall under. The rearward wall is folded inwardly by an overhead kicker 26, which is timed in relation to the travel of the blank, but which operates at a higher ratio of speed, serving to lift the rear wall forward and fold it down into position, the blank now being in the condition illustrated in Figure 5.

Thereupon the blank may travel beneath a pressure belt 31 or other means to obtain initial contact of the adhesive areas, after which the blank is delivered to the stacking conveyor 29 which moves slowly and serves to secure final adhesion of the panels.

Because the various mechanical elements shown in the diagrammatical illustration are all known in the art, it has not been thought necessary to explain their functioning or operation in detail. It can readily be seen, however, that a machine such as illustrated is capable of accomplishing the folding and gluing operation described at high speed, and also it is a comparatively simple mechanism to build and operate because of the fact that the blank travels in only one direction, and it is not necessary to change its position in relation to its direction of travel.

One important advantage of the knockdown box produced by my method is that it makes possible a box with corners that are liquid tight. The corners of the finished box can be fitted so closely that the usual pin holes or small openings found at the corner portions of glued knockdown boxes are eliminated, thereby making a box that will hold liquids without leakage. This is a most important feature for many types of packaging, as for example trays or boxes to be used for frozen foods and the like, and the production of such a liquid-tight paper box is one of the objects of my invention.

It is obvious that the box illustrated in the drawing may be used as a tray, that is, what is commonly known in the trade as a "boat" or that two such boxes as shown can be telescoped together, making a two piece box consisting of a bottom and a lid. Or, if desired, an extra panel having tucks or side flaps may be articulated to one of the side walls of the box illustrated, thereby making a one piece box with hinged lid attached. All such variations are contemplated within the scope of my invention.

In regard to my method as disclosed, it is also possible, if desired, to raise the end walls B and B¹ of the blank prior to folding back along the lines of diagonal fold. Other variations are possible in my method, in regard to such points as the stage at which adhesive is applied, as it is obvious that it is immaterial to the successful operation of my method at which particular stage adhesive is applied, just so the basic requirement is met of having adhesive between the desired meeting surfaces prior to making the final folds. These and other variations of my essential method are included in the scope of my invention.

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

1. That method of making infolded knockdown boxes from blanks having a main body panel, a pair of opposite side walls, and a pair of opposite end walls, said end walls having diagonal lines of fold therein defining triangular portions and articulated thereto corner flaps, which comprises bringing said end walls into infolded position overlying the main body panel with the triangular portions thereof and the corner flaps folded back along said diagonal lines of fold, and thereafter folding in said corner flaps to overlie said folded triangular portions, retaining all folds in folded position, and folding said side walls inwardly to overlie said previously folded corner flaps.

2. That method of making infolded knockdown boxes from blanks having a main body panel, a pair of opposite side walls, and a pair of opposite end walls, said end walls having diagonal lines of fold therein defining triangular portions and articulated thereto corner flaps, which comprises bringing said end walls into infolded position overlying the main body panel with the triangular portions thereof and the corner flaps folded back along said diagonal lines of fold, and thereafter folding in said corner flaps to overlie said folded triangular portions, retaining all folds in folded position, and folding said side walls inwardly to overlie said previously folded corner flaps, adhesive having been introduced between meeting surfaces of said corner flaps and said side walls.

3. That method of making infolded knockdown boxes from blanks having a main body panel, a pair of opposite side walls, and a pair of

opposite end walls, said end walls having diagonal lines of fold therein defining triangular portions and articulated thereto corner flaps, which comprises bringing said end walls into infolded position overlying the main body panel with the triangular portions thereof and the corner flaps folded back along said diagonal lines of fold, and thereafter folding in said corner flaps to overlie said folded triangular portions, retaining all folds in folded position, and folding said side walls inwardly to overlie said previously folded corner flaps, adhesive having been introduced between meeting surfaces of said corner flaps and said side walls, and thereafter applying pressure to secure adhesive.

4. That method of making infolded knock-down boxes from blanks having a main body panel, a pair of opposite side walls, and a pair of opposite end walls, said end walls having diagonal lines of fold therein defining triangular portions and articulated thereto corner flaps, which comprises moving said blank along and bringing said end walls into infolded position overlying the main body panel with the triangular portions thereof and the corner flaps folded back along said diagonal lines of fold, and thereafter folding in said corner flaps to overlie said folded triangular portions, retaining all folds in folded position, and folding said side walls inwardly to overlie said previously folded corner flaps.

5. That method of making infolded knockdown boxes which comprises providing blanks having a main body panel, a pair of opposite side walls,

and a pair of opposite end walls, said end walls having diagonal lines of fold therein defining triangular portions and articulated thereto corner flaps, which consists in moving said blanks along in the direction of motion parallel to the end walls, folding the triangular portions thereof and the corner flaps backwardly along said diagonal lines of fold and folding in the end walls and thereafter folding in said corner flaps to overlie said folded triangular portions, retaining all folds in folded position, and folding said side walls inwardly to overlie said previously folded corner flaps.

6. That method of making infolded knock-down boxes which comprises providing blanks having a main body panel, a pair of opposite side walls, and a pair of opposite end walls, said end walls having diagonal lines of fold therein defining triangular portions and articulated thereto corner flaps, which consists in moving said blanks along in the direction of motion parallel to the end walls, folding the triangular portions thereof and the corner flaps backwardly along said diagonal lines of fold and folding in the end walls and thereafter folding in said corner flaps to overlie said folded triangular portions retaining all folds in folded position, and folding said side walls inwardly to overlie said previously folded corner flaps, adhesive having been introduced between meeting surfaces of said corner flaps and said side walls.

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