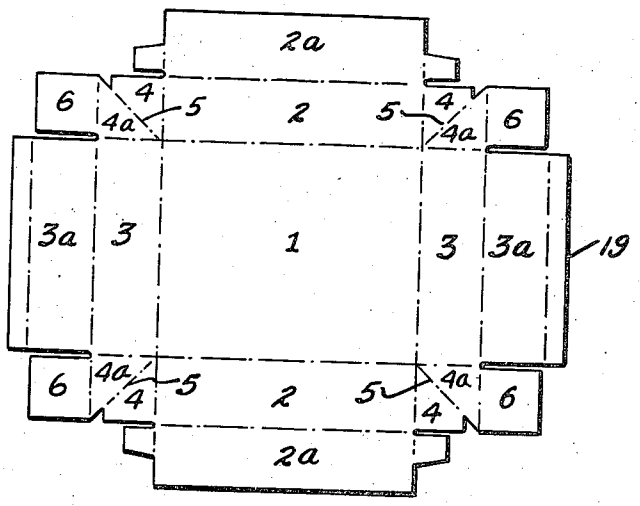
Oct. 8, 1940. S. BERGSTEIN 2,217,504

METHOD OF MAKING KNOCKDOWN BOXES

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FIG. 1.



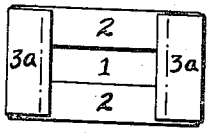


FIG. 4.

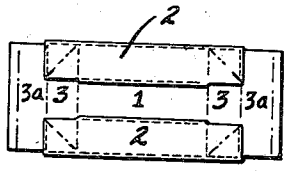


FIG. 3.

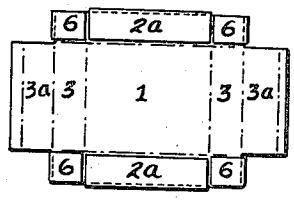


FIG. 2.

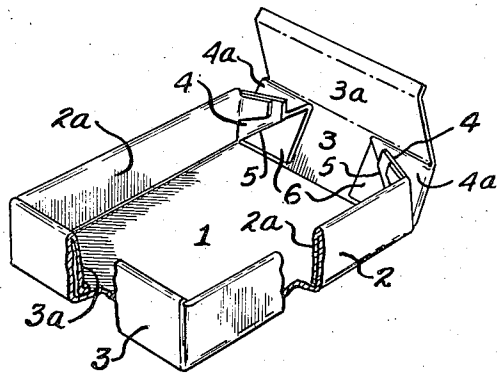


FIG. 4a.

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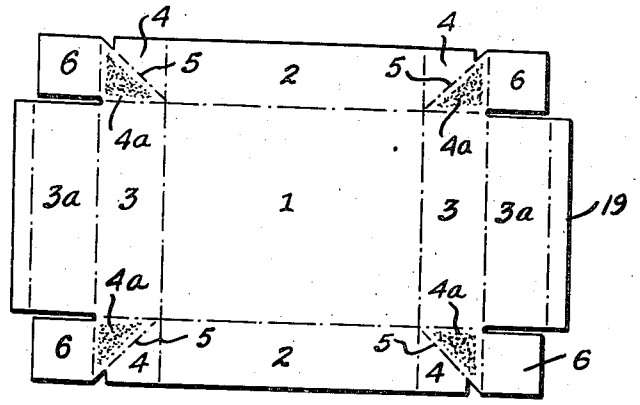


FIG. 5.

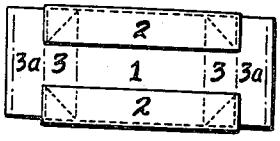


FIG. 8.

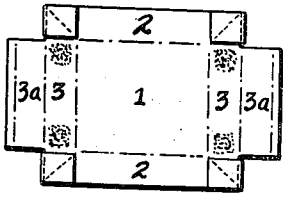


FIG. 7.

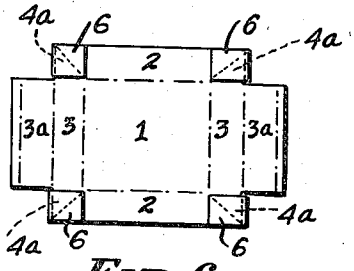


FIG. 6.

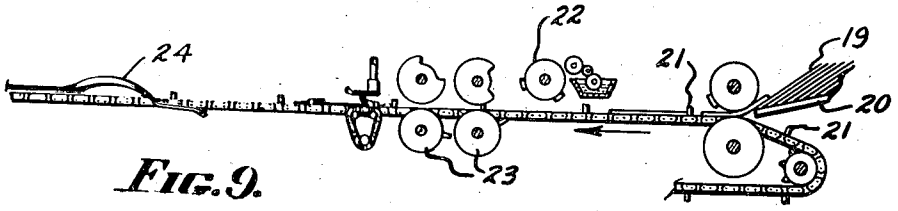


FIG. 9.

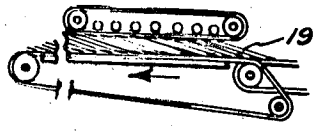


FIG. 10.

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Patented Oct. 8, 1940

2,217,504

UNITED STATES PATENT OFFICE

2,217,504

METHOD OF MAKING KNOCKDOWN BOXES

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

Application June 27, 1939, Serial No. 281,444

6 Claims. (Cl. 93—49)

This application is a continuation in part of my copending application Serial No. 165,373 filed September 23, 1937. In said application I have shown an improved box blank, provided with reinforcing tabs, which tabs are made from material which is normally cut to waste at the corners of the blank. Such a blank has advantages upon being folded into erect form of providing a more sturdy box, with stronger ends, without necessitating the use of extra box material.

My invention as herein disclosed is directed to methods whereby a blank such as described in my copending application may be shipped in prefolded form, with the reinforcing tabs being folded in between the end walls and the corner-connecting sections. By this method the tabs are folded out of the way, providing a compact folded blank for shipping and storage purposes, and the erection of the blank is greatly facilitated due to the fact that the tabs in their folded condition overlying the end walls serve to stiffen the end wall and thereby make assembly easier. Further, by my method as herein disclosed, the tabs may be adhesively secured to the end walls, and in addition the tabs may be secured to the corner-connecting sections if desired, facilitating to a still further degree the ready and rapid assembly of the folded blank into erect form, and also making for increased rigidity without adding to the cost of producing the boxes. By my method, when such adhesively secured corners are desired, the reinforcing tabs provided a maximum available area for adhesive application, and also serve to provide an extra thickness of stock at the corners, to assure pressure when stacked in flat folded form under conveyor belts, thereby assuring adhesion more positively. These and other objects of my invention will appear as the description proceeds, and the nature and scope of my invention is set forth in the claims appended hereto.

Referring now to the drawings:

Figure 1 illustrates one form of flat cut and creased blank suitable to my method.

Figure 2 illustrates the first stage of the folding operation of the blank shown in Figure 1, according to my method.

Figure 3 shows a subsequent stage of the folding operation.

Figure 4 shows the final stage of the folding operation, the folded blank as shown being in condition for shipment.

Figure 4*a* shows the box of Figure 4 in erect form.

Figure 5 illustrates the blank shown in Figure 1 except with adhesive applied to the portions of the corner section.

Figure 6 shows the first stage in folding the blank shown in Figure 5, the reinforcing tabs having been folded over upon the corner-connecting sections, with adhesive therebetween.

Figure 7 illustrates the blank shown in Figure 6 with adhesive applied to portions of the end walls.

Figure 8 shows a subsequent stage of folding the blank shown in Figure 7, the side walls and corner-connecting sections having been folded inwardly, there being adhesive between the reinforcing tabs and the end walls.

Figure 9 illustrates diagrammatically one machine which may be used for carrying out the folding or folding and gluing operations on the blanks described above.

Figure 10 illustrates in detail folded glued boxes stacked on the delivering conveyor at the end of the machine.

Referring to the blank in Figure 1, the main body panel is indicated at 1, side walls 2, and end walls 3. Articulated to the side and end walls at the corners are corner-connecting sections, which are divided by a line of fold 5 into two portions 4 and 4*a*. Articulated to the end walls 3 are overlapping panels 3*a*, and articulated to the corner-connecting sections are reinforcing tabs 6.

Figure 2 shows the first stage of folding the blank according to my method. The reinforcing tabs 6 have been folded inwardly to overlie the corner-connecting sections, as illustrated.

Figure 3 shows a succeeding stage of the folding. With the reinforcing tabs retained in folded position, as illustrated in Figure 2, the side walls 2 and the corner-connecting sections have now been folded inwardly, so that the reinforcing tabs now lie folded between the corner-connecting sections and the end walls. In this flat folded form the box may now be shipped.

Figure 4 illustrates an additional stage of folding that may be effected if desired, the overlapping panel having been folded inwardly, making a more compact form of the box for shipment, than the box illustrated in Figure 3. However, this folding over of the overlapping panel, while desirable, is not necessary.

In Figure 4*a*, one end has already been placed into erect position, while the other end illustrates a step in the erection, showing how the reinforcing tabs remain in folded position along

the end wall, the corner section folding reversely along the diagonal line 5, in position for the overlapping panel to be folded down into the box, to retain the erect condition. It can be seen that by shipment in this pre-folded form, the assembly is a very simple and rapid matter, as upward pressure on the end wall starts to double the corner sections back along the diagonal lines of fold therein, serving thereby to bring the side walls into erect position, and it can be seen that the presence of these reinforcing tabs in their folded position between the corner sections and the end walls serves to stiffen the end wall and act as an extra reinforcement, making assembly more simple and more positive.

To further facilitate the assembly of the box, and to further reinforce the end walls and to strengthen the box at the corners, the reinforcing tabs may be adhesively secured to the end walls and also to the corner sections if desired. Figure 5 shows the blank indicated in Figure 1, with adhesive applied to the portions 4*a* of the corner-connecting sections.

Thereafter, as shown in Figure 6, the reinforcing tabs may be infolded to overlie the corner-connecting sections, and of course adhesively securing the portions 4*a* of the corner-connecting sections to the corresponding portion of the reinforcing tabs.

Figure 7 shows a subsequent stage, adhesive having been applied to the portions of the end walls indicated by the shading.

Thereafter, as shown in Figure 8, the side walls and the corner-connecting sections may be folded inwardly, the reinforcing tabs having been retained in their folded and adhered position, whereby the outer surface of the reinforcing tabs are now adhesively secured to the end walls. The folded and glued box in flat knock down form shown in Figure 8 if desired may have the overlapping panel folded inwardly, preparatory to shipment. The box is assembled in the same way as previously shown in Figure 4*a*, and it can readily be seen that the adhesion of the reinforcing tabs both to the corner-connecting sections and the end walls assures a more positive assembly, and also adds to the rigidity of the finished erected box.

Either one or the other or both of the stages of gluing illustrated in the above series of drawings can be used. For example, the reinforcing tabs can be adhered to the corner-connecting sections and not to the end walls, or the reinforcing tabs can be folded inwardly to overlie the corner-connecting sections, without being adhered to them, and adhesive can be introduced on the subsequent stage of folding to secure the reinforcing tabs to the end walls. Or, as in the series of drawings above, the reinforcing tabs can be adhered both to the corner sections and the end walls.

In passing it should be noted that it is immaterial to my method whether the adhesive is applied to the surface of the tabs or to the corresponding portions of the surfaces to which the tabs are to be adhered, and it is also immaterial to my method at which particular stage the adhesive is applied, so long of course as the adhesive is introduced prior to the folding of the surfaces which it is to join together. Also, it will be apparent that the adhesive which is applied to the corner-connecting portions 4*a* and the end walls 3, as seen in Figures 5 and 7, could be applied simultaneously. That is, all the adhesive could be applied to the blank at the stage illustrated in Figure 5.

Figure 9 illustrates one machine suitable for producing my box. The blanks 19 as illustrated in Figure 1 or Figure 5 are placed in a standard type feed hopper 20, and the blanks are withdrawn singly, the direction of motion being parallel to the side of the box. (Here and throughout, the use of the terms "sides" or "ends" has no reference to the relative proportions of the box, these terms being used merely to clarify the description, the end wall panels of the blank being considered the walls to which are articulated additional flaps either for locking or friction hold in assembling the box.) After the blank is fed out, it is picked up by pins 21 at spaced intervals, and the blanks are carried forward individually in timed relation.

I illustrate a timed overhead glue applying mechanism 22. This may apply adhesive to the portions 4*a* of the blanks or to those portions of the flaps 6 which correspond therewith. In my construction as illustrated in Figure 5, adhesive may at the same time be applied to the portions of the walls 3.

My construction is adaptable whether the blank has the side walls with an extra panel to be folded over, making a double wall, or whether the sides are single. If the box is double wall style as illustrated by Figure 1, adhesive between the extending wall 2*a* and the side panel 2 can be introduced prior to the steps above mentioned, and the wall folded over, and secured in position.

Continuing now with the description of the diagram of Figure 9, the timed score breakers 23 now fold the tabs 6 or 16 upwardly and inwardly to overlie the corner-connecting panels. In this position the blank is as illustrated in Figures 2 or 6.

With these adhesive tabs now held in folded position, the side walls and the corner-connecting panels are folded over by folder 24, so that the outer faces of the adhesive tabs 6 are now secured by the adhesive previously applied to the inner face of the end panels, the adhesive tabs being interposed between the folded in corner panels and the corresponding portions of the end walls of the box.

Figure 10 illustrates a detail of the stacking conveyor such as customarily used for securing adhesion between folded portions of blanks to which adhesive has been applied. The blanks are piled on the conveyor in offset or staggered relation, and it is apparent that when so placed, the pressure between the conveyor belts is naturally applied to the portions of the blanks which are the thickest, that is the portions where there are the maximum number of thicknesses. The presence of my infolded reinforcing tabs, provides an additional layer of board thickness at the corner portions of my folded blank, assuring the maximum pressure from the stacking conveyor at the corner portions to assure positive adhesion.

It is obvious that there are other mechanical means suitable to carrying out my method. For example, the blanks could be initially conveyed on a machine in the direction of motion parallel to the end walls. By stationary guiding means in the path of travel of the blank, the overlapping panels could be guided downwardly below the plane of the blank, so that by the use of other stationary guiding means the reinforcing tabs could be picked up and folded inwardly to overlie the corner-connecting sections. Then the position of the blank in relation to its direction of

motion could be changed, so that the blank would be traveling parallel to the side walls, and—the reinforcing tabs being retained in folded position—the side walls and corner-connecting sections can now be folded inwardly, so that the reinforcing tabs would lie folded between the end wall and the corner-connecting section. And in the use of a mechanism of this sort to carry out my method, of course, the application of glue or adhesive between the reinforcing tab and the corner-connecting section, or between the reinforcing tab and the end wall, or both, could readily be effected also.

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

1. A method of folding and gluing a knockdown box adapted for ready erection from a blank having a main body portion, end walls having articulated thereto additional panels adapted to be folded over when erecting the box, and side walls, said side and end walls being connected by diagonally foldable corner sections, said corner-connecting sections having reinforcing tabs articulated thereto, which consists of folding said reinforcing tabs inwardly upon the corner-connecting sections to which said tabs are articulated, and thereafter folding said side walls inwardly to overlie the main body portion, adhesive having been introduced between said reinforcing tabs and corresponding portions of end walls, and thereafter applying pressure to secure adhesion between said reinforcing tabs and corresponding portions of said end walls.

2. A method of folding and gluing a knockdown box adapted for ready erection from a blank having a main body portion, end walls having articulated thereto additional panels adapted to be folded over into the box when erected, and side walls, said side and end walls being connected by diagonally foldable corner sections, said corner-connecting sections having reinforcing tabs articulated thereto, which consists of folding said reinforcing tabs inwardly upon the corner-connecting sections to which said tabs are articulated, and thereafter folding said side walls inwardly to overlie the main body portion, adhesive having been introduced between said reinforcing tabs and corresponding portions of end walls, and also between part of corner-connecting portion on one side of line of diagonal fold therein, and said reinforcing tabs, and thereafter applying pressure to secure adhesion between said tabs and corresponding portions of said end walls and between said tabs and said part of corner-connecting portion.

3. A method of making a knockdown box adapted to ready erection comprising a main body portion, end walls having articulated thereto additional panels adapted to be folded over into the erected box, and side walls having auxiliary panels secured thereto, which consists of folding over and adhering said auxiliary panels to the side walls to which said panels are secured, folding said reinforcing tabs inwardly upon the diagonally scored corner-connecting sections to which said tabs are articulated, and thereafter folding said side walls inwardly to overlie the main body portion, adhesive having been introduced between said reinforcing tabs and corresponding portions of end walls, and thereafter applying pressure to secure adhesion between said reinforcing tabs and corresponding portions of said end walls.

4. A method of folding and gluing a knockdown box adapted for ready erection from a blank having a main body portion, end walls having articulated thereto additional panels adapted to be folded over into the erected box, and side walls, said side and end walls being connected by diagonally foldable corner sections, said corner-connecting sections having reinforcing tabs articulated thereto, which consists of folding said reinforcing tabs inwardly upon the corner-connecting sections to which said tabs are articulated, and thereafter folding said side walls inwardly to overlie the main body portion, adhesive having been introduced between said reinforcing tabs and corresponding portions of end walls, and thereafter applying pressure to secure adhesion between said reinforcing tabs and corresponding portions of said end walls, and thereafter folding inwardly the additional panels articulated to said end walls, to overlie said corner sections.

5. A method of making a box in knocked-down form from a blank having a main body panel, side walls and end walls, and tabs connected to said side walls by diagonally creased connecting corner panels, comprising initially folding said tabs in upon said connecting corner panels, retaining said tabs in folded condition, and thereafter folding inwardly said side walls along the lines of fold substantially at right angles to said initial lines of fold of said tabs, so as to interpose said tabs between the corner-connecting panels and said end walls, and applying adhesive to secure said tabs to said end walls.

6. A method of making a knockdown box adapted to ready erection from a blank having side walls, end walls with overlapping panels articulated thereto, and diagonally foldable corner-connecting sections having reinforcing tabs connected thereto, which comprises moving said blank along, and initially folding said tabs inwardly to overlie the corner-connecting sections, retaining said tabs in folded position, and thereafter folding the side walls and the corner-connecting sections inwardly along lines of fold substantially at right angles to said initial lines of fold of said tabs.

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