

Oct. 27, 1953

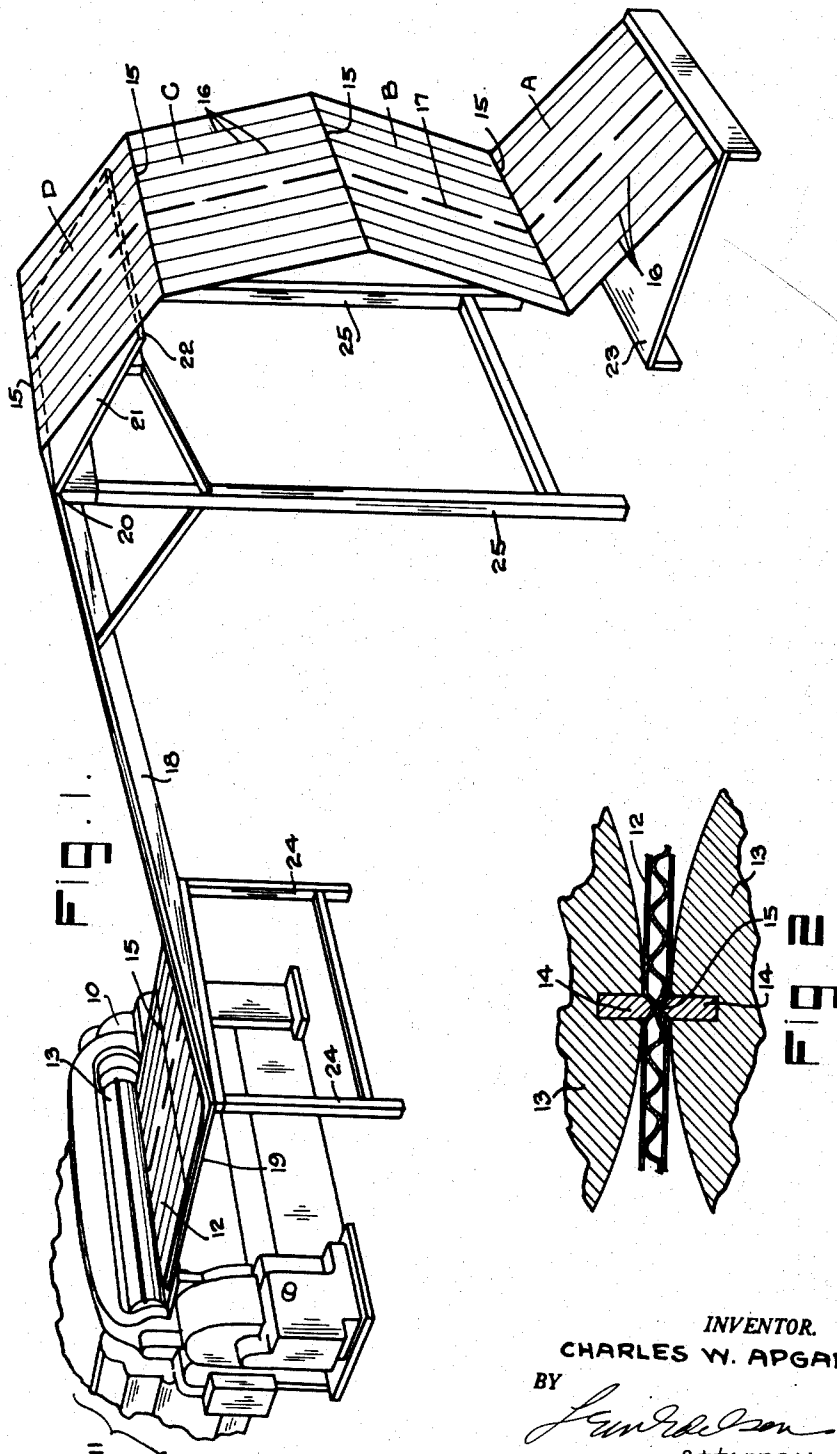
C. W. APGAR

2,657,044

APPARATUS FOR HANDLING CORRUGATED PAPERBOARD

Filed Aug. 31, 1950

2 Sheets-Sheet 1



INVENTOR.
CHARLES W. APGAR
BY *Lawrence J. Anderson*
Attorney

Oct. 27, 1953

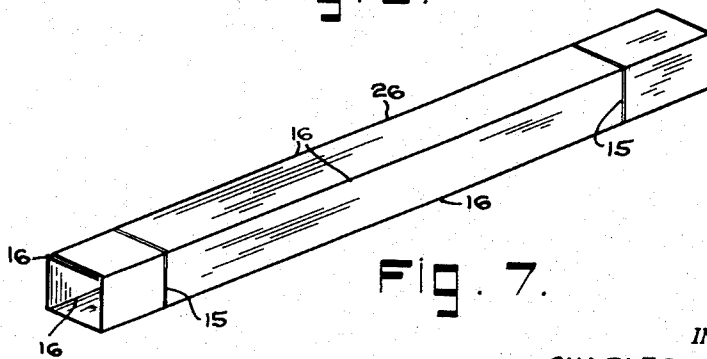
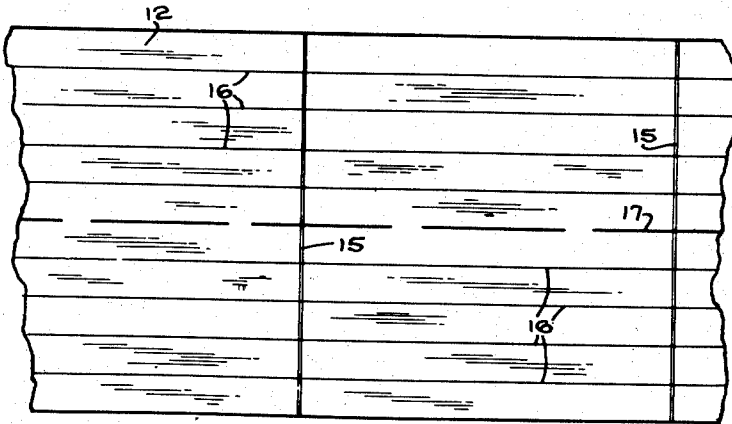
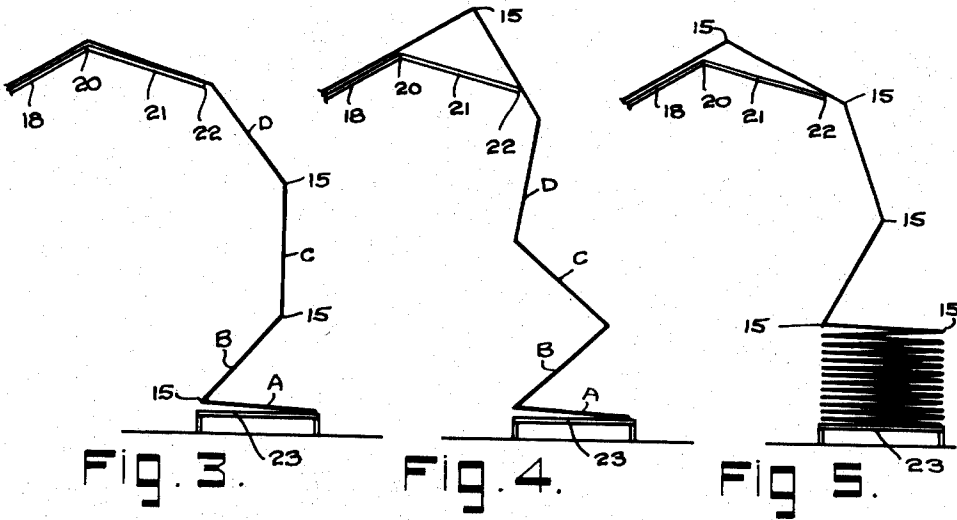
C. W. APGAR

2,657,044

APPARATUS FOR HANDLING CORRUGATED PAPERBOARD

Filed Aug. 31, 1950

2 Sheets-Sheet 2



INVENTOR.
CHARLES W. APGAR
BY *Frank Edelson*
Attorney

UNITED STATES PATENT OFFICE

2,657,044

APPARATUS FOR HANDLING CORRUGATED
PAPERBOARD

Charles W. Apgar, Philadelphia, Pa., assignor to
Seaboard Container Corporation, Bristol, Pa.,
a corporation of Pennsylvania

Original application March 18, 1949, Serial No.
82,188. Divided and this application August
31, 1950, Serial No. 182,539

3 Claims. (Cl. 270-61)

1

This invention relates generally to apparatus of the type adapted to produce corrugated paper board in endless strip form and more specifically to such apparatus in combination with means adapted to form container-forming blanks of said board in folded strip form, this application being a division of Patent No. 2,604,984.

Heretofore and prior to the present invention, it has been the common and conventional practice in the manufacture of corrugated board for use as container blanks to produce individually cut and scored blanks of the exact size and shape required to form a particular carton or container, the individual blanks being then shipped to the user to be set up by the latter into carton form as required to meet his packaging requirements. In many instances the products to be packaged by an individual user of the corrugated paper board containers vary in size and thus require correspondingly different sized containers, as a result of which the user of the container is required to maintain on hand a considerable stock of different sizes of container blanks certain of which may be only infrequently used. This problem of economically maintaining on hand an adequate stock of container blanks is particularly acute in the case of Venetian blind manufacturers, for example, who manufacture blinds of varying widths and so find it necessary to use shipping containers of correspondingly varying lengths. It sometimes occurs that the blind manufacturer finds itself without a supply on hand of the requisite length shipping container and to prevent such occurrence the blind manufacturer usually maintains on hand a supply of all sizes of containers, many of which sizes are so infrequently used in relation to others as to be economically wasteful both from the standpoint of money invested in inventory and space consumed in the storage of excess container blanks.

The present invention has as its principal object the manufacture of corrugated paper board in continuous strip form for use in the production of tubular containers and the arranging thereof in fan-folded bundles for shipment to and storage by the user of the container, the arrangement of the board as supplied to the container user being such as to enable the latter to make up containers of different length to most economically meet his special packaging requirements and to dispense with the necessity of maintaining on hand a stock of different sized blanks for corrugated paper board containers.

It is an object of the present invention to pro-

2

vide a container-forming blank in strip form of corrugated paper board comprising continuous sections of said board fan-folded along transverse lines to form a pile of board sections, the lengths of the containers adapted to be made from said blanks being independent of the lengths of said sections.

It is a still further object of the present invention to raise the discharged transversely scored endless board strip to such an elevation above a base level as to permit the board strip to descend and to be fan-folded in a pile of sections upon said level.

An additional object is to provide means for successively and continuously forming partial folds between adjacent board sections to facilitate the fan-folding operation.

Other objects and advantages of the present invention will appear more fully hereinafter, it being understood that the present invention consists substantially in the combination, construction, location and relative arrangement of parts and in the method of procedure, all as described in the following specification, as shown in the accompanying drawings and as finally pointed out in the appended claims.

In the accompanying drawings—

Figure 1 is a perspective view showing the discharge end of a continuous corrugated board forming machine in association with an upwardly extending inclined chute upon which the board is moved to a position for fan folding;

Figure 2 is a fragmentary view in section showing the formation of transverse score or fold lines in the board by the scoring rollers of the board forming machine;

Figures 3, 4 and 5 are diagrammatic views showing various stages in the fan-folding of the board;

Figure 6 is a plan view of a length of the continuous board showing the transverse fold lines and longitudinal score lines; and

Figure 7 is a perspective view showing a container made from a length of board obtained from the fan-folded pile thereof.

Heretofore in the art of forming relatively long narrow corrugated cardboard containers of the type used to box relatively long narrow products, such as rolled up or compacted Venetian blinds or the like, it has been customary to provide container-forming blanks of varying lengths depending upon the lengths of the products to be boxed. Accordingly, it was necessary for the container-forming blank manufacturer to make up quantities of blanks of the individual lengths

3

required and it was necessary for the user of these blanks to store quantities of the different length blanks in anticipation of the use thereof for different lengths of products to be boxed. Inasmuch as it was not always possible for the product manufacturer to anticipate his requirements in the matter of particular lengths of container forming blanks to coincide with the actual demand of particular lengths of products, it frequently happened that despite storage of large quantities of different length blanks one size would be used to the exclusion of other sizes. It would then be necessary to re-order or to cut down larger size blanks to a smaller size for immediate use resulting in undesirable waste of material. Furthermore space would be needed to store the unused blanks.

The present invention overcomes the disadvantages of the prior art by creating container forming blanks in such form as to avoid waste, as well as to avoid the necessity of storing a large number of different size blanks. The container-forming blanks of the present invention are cut to correct length as needed from a single source of supply made up in the form of fan-folded continuous sections of corrugated board. Accordingly, there is little or no waste of material in the box making and there is a tremendous saving in storage space with its attendant economy in reduced inventory.

The formation of the fan-folded box blanks will be understood by reference to the drawings, wherein Figure 1 shows the discharge end 10 of a conventional machine 11 adapted to manufacture the relatively stiff corrugated paper board 12 continuously in endless strip form. This machine customarily cuts the board strip transversely into separated lengths by means of knives set in a pair of opposed upper and lower rotary rollers 13—13, prior to discharge of the board under power. In the present invention, these cutting knives are replaced by scoring bars 14—14 set in the outer surfaces of rollers 13—13 so that the projecting ends thereof are periodically in sufficiently close registry during each rotation of the rollers, Figure 2, with the board 12 therebetween to score the same inwardly from its opposite outer surfaces to form fold lines 15 at spaced intervals along the endless strip of the board 12. It will be noted that board 12 is provided with longitudinally extending score lines 16 on each side of a central longitudinally extending cut or separating line 17, these lines having been formed in the board by the machine 11 at operational stage preceding that of the scoring rollers 13—13. The cut line 17 is provided so that lengths of the board 12 may be readily separated into identical halves with each half providing a box forming blank. It will be obvious that the separating line 17 may be placed off-center or entirely eliminated depending upon the width of the board 12 and upon the size of the boxes desired to be made from the blanks. Likewise, the particular number and spacing of the transverse score lines 16 may be changed depending upon the shape and the number of sides desired in the finished box. For example, with the present number of four equally spaced score lines 16, a rectangular box, as shown in Figure 7, may be conveniently made. However, by providing a greater or lesser number of score lines either equally or unequally spaced other shaped multi-sided boxes may readily be formed.

As the board strip 12 is discharged by the machine 11 it is desirably raised to a sufficient height

4

for fan-folding above the surface upon which the folded board is adapted to be received. In the present embodiment of the invention, a relatively long upwardly extending sufficiently wide smooth-surfaced inclined member 18 of any suitable material is provided in extension of a delivery table or conveyor 19 suitably supported on the framing of the machine 11 immediately in advance of the scoring rollers 13—13 at a level to properly receive the horizontally discharged moving board 12. In extension of the upper end 20 of the member 18 there is provided a relatively short-smooth-surfaced downwardly extending member 21 having a terminal end 22 disposed above a movable pallet 23 upon which the folded board is to be stacked. Suitable supporting up-rights 24 and 25 adequately braced are provided to maintain table 19 and members 18 and 21 in their described positions.

In the operation of the apparatus above described, in which the machine 11 has been initially set to provide the desired longitudinal score and separating lines 16 and 17 and the rotary speed of the rollers 13—13 has been adjusted relative to the linear speed of the board 12 throughout to provide transverse fold lines 15 uniformly spaced apart the requisite distance, the board 12 is discharged in endless length to move forwardly over the table 19, then over the inclined member 18 to the end 20 thereof and thence downwardly over the inclined member 21 to the free end 22 thereof from whence it descends to a position where one or more operators guide and fold the board alternately in opposite directions along the lines 15 preparatory to stacking the same on the receiving pallet 23. Referring to Figures 1, 3, 4 and 5, it will be noted that due to its inherent stiffness, the board 12 as it is fed along the inclined member 18, continues on in substantially its own plane (Figure 4) to present successive fold lines 15 at the high point or corner 20, whereupon the board is successively partially folded along its fold lines 15 over the said corner 20 so that further movement of the board is in a downward direction over the reversely inclined member 21, where the board 12 is again subjected to successive folding along lines 15 over the terminal edge 22 of the inclined member 21. It will be noted also that these folds are all initially in the same direction and since alternate folds should be in opposite directions for stacking, it is necessary for the operator to manually reverse the direction of certain of the folds. However, the preliminary creasing of the board on lines 15 over the edges 20 and 22 facilitates such reverse folding by the operator.

At the beginning of the operation (Figures 1 and 3), initial section A of board 12 is deposited on pallet 23 after the operator has folded section B, relative to section A, in a direction opposite to the fold imparted previously between these sections by the edges 20 and 22 of the overhead board delivery structure. As seen in Figure 4 as the board advances, section C has moved from its position in Figure 3 in order to fold over section B along the direction of the fold previously imparted to these sections. In order that section D may move from its position in Figure 3 to be folded over section C, the direction of the established fold between sections C and D (Figure 3) is reversed by the operator from that shown in Figure 4. As the board continues to be folded in sections, it is stacked upon pallet 23 until a pile of sufficient height is obtained, as shown in Figure 5, whereupon the stacked pile with its

pallet may be removed to permit the formation of succeeding stacks on other pallets. It is customary to cut the board upon the removal of each stack of folded sections, the latter then being in convenient form for whatever further handling is required.

In order to form a container blank of any desired length from the folded board sections regardless of the length of the sections between fold lines 15, it is only necessary to open out the top few folded sections and then to cut off the desired length without regard to the position of the fold lines. If the board is provided with a cutting line 17, the cut length is first separated into two halves to provide two container blanks. In the portion of the board shown in Figure 6 there are two fold lines 15 and it may be that a cut off length will contain one or more of these. As shown in Figure 7, the relatively long box 26 is formed from a blank cut to requisite length from the unfolded board shown in Figure 6. The box illustrated is formed by folding the blank along the longitudinal score lines 16 and securing the opposite side panels in overlapped relation by any suitable means. The ends of the box may remain open or may be closed in any desired manner. It will be noted that once the box 26 has been completed the transverse fold lines 15 have no effect upon the strength and rigidity thereof. In a similar manner boxes of any requisite length may be formed and it is possible to make them of any multi-sided shape, by the proper disposition of the longitudinal score lines in the fan-folded strip of the container-forming board.

It will be understood, of course, that the present invention is susceptible of various changes and modifications which may be made from time to time without involving any departure from the real spirit or general principles of the invention, and it is accordingly intended to claim the same broadly, as well as specifically, as indicated in the appended claims.

What is claimed as new and useful is:

1. In an apparatus of the type adapted to produce corrugated paper cardboard in endless strip form and to discharge the same, in combination therewith means adapted to form spaced board sections defined by transversely extending score lines in said strip, an upwardly extending inclined member having its lower terminal end disposed in operative relation to the discharge end of said apparatus to receive said board strip, and a downwardly extending inclined member in continuation of the upper terminal end of said first named member, said board strip travelling over said members and being elevated thereby, the lower terminal end of said second named member being at an elevation from which said board

may descend and be continuously fan folded along said score lines to form a stack of said sections, the upper terminal ends of said members and the lower terminal end of said second named member acting to partially fold said sections about said score lines as said sections are drawn downwardly thereover by their own weight.

2. In an apparatus of the type adapted to produce corrugated paper cardboard in endless strip form and to discharge the same, in combination therewith means adapted to form spaced board sections defined by transversely extending score lines in said strip and an elongated member having a pair of flat surfaces inclined to form a ridge intermediate the ends thereof, one of said ends being disposed proximate the discharge end of said apparatus to receive said board strip for travel thereof over said member, the other of said ends being disposed at an elevation from which said board may descend and be continuously fan folded along said score lines to form a stack of said sections, said ridge and the edge of said other end being parallel to one another and acting to partially fold said sections about said score lines as said sections pass thereover and are urged downwardly by their own weight.

3. In an apparatus of the type adapted to produce corrugated paper cardboard in endless strip form and to discharge the same, in combination therewith means adapted to form spaced board sections defined by transversely extending score lines in said strip and an elongated member having a pair of flat surfaces inclined to form a ridge intermediate the ends thereof, one of said ends being disposed proximate the discharge end of said apparatus to receive said board strip for travel thereof over said member, the other of said ends being disposed at an elevation from which said board may descend and be continuously fan folded along said score lines to form a stack of said sections, said ridge and the edge of said other end being parallel to one another and acting to partially fold said sections about said score lines in the same direction as said sections pass thereover and are urged downwardly by their own weight.

CHARLES W. APGAR.

References Cited in the file of this patent
UNITED STATES PATENTS

Number	Name	Date
758,672	Mayall	May 3, 1904
944,536	Bonfield et al.	Dec. 28, 1909
1,183,005	Hageman	May 16, 1916
1,823,475	Scudds	Sept. 15, 1931
2,185,675	Mitchell et al.	Jan. 2, 1940
2,349,056	Serai	May 16, 1944