May 22, 1951 R. E. ACKER 2,553,733

MACHINE FOR SETTING-UP CORNER LOCKING TRAYS

Filed Feb. 20, 1948 3 Sheets-Sheet 1

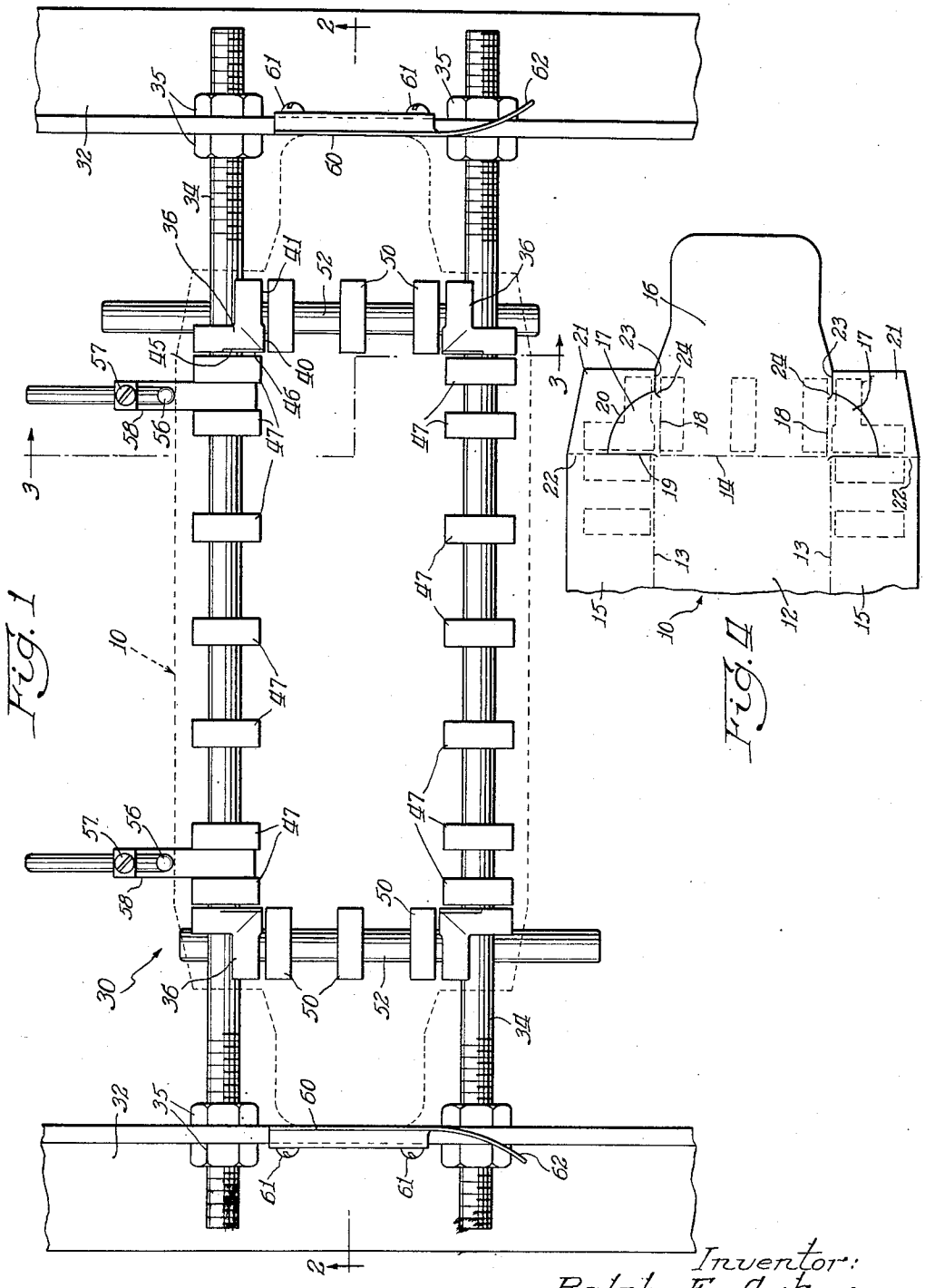


Fig. 1

Fig. 4

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Filed Feb. 20, 1948 3 Sheets-Sheet 2

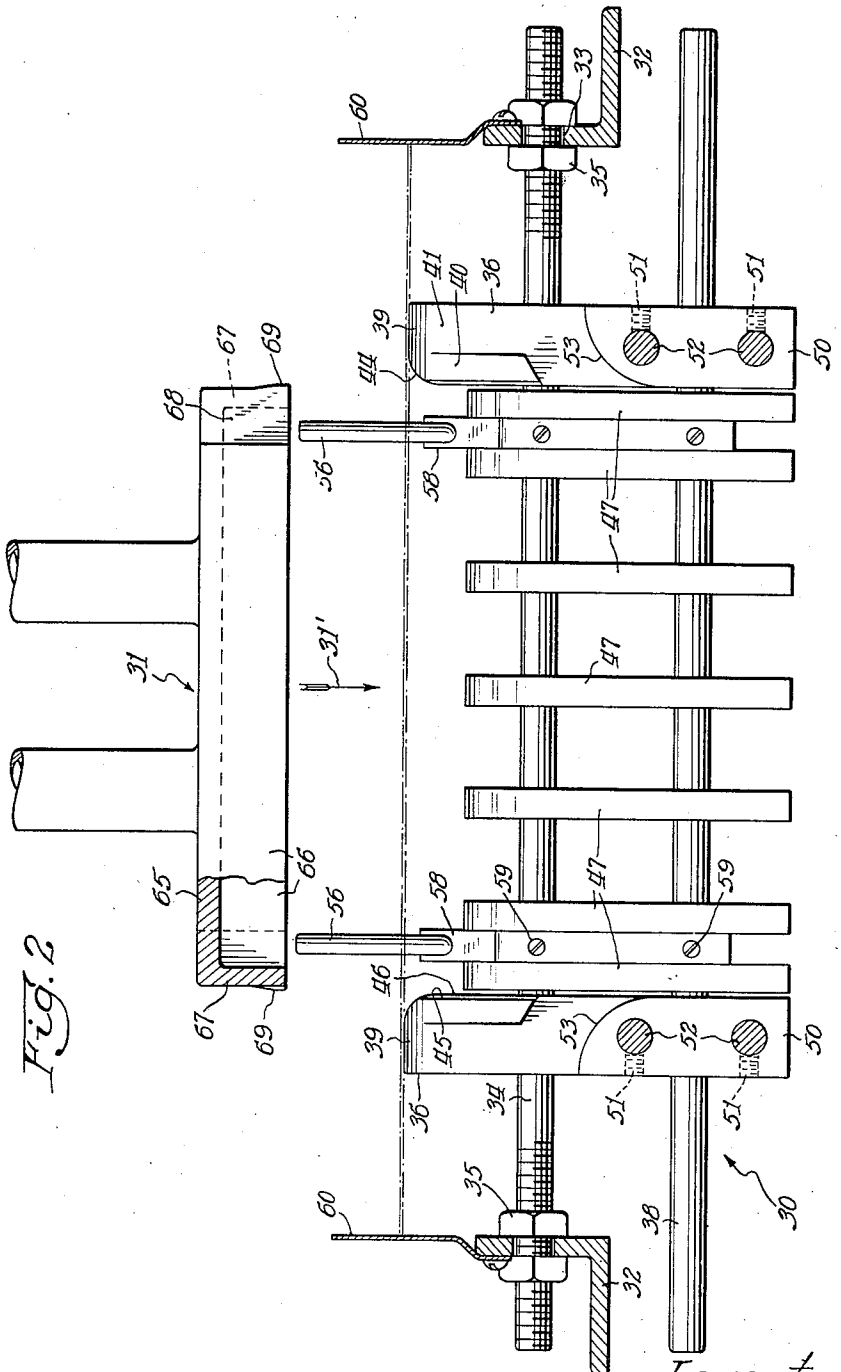


Fig. 2

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Fig. 3

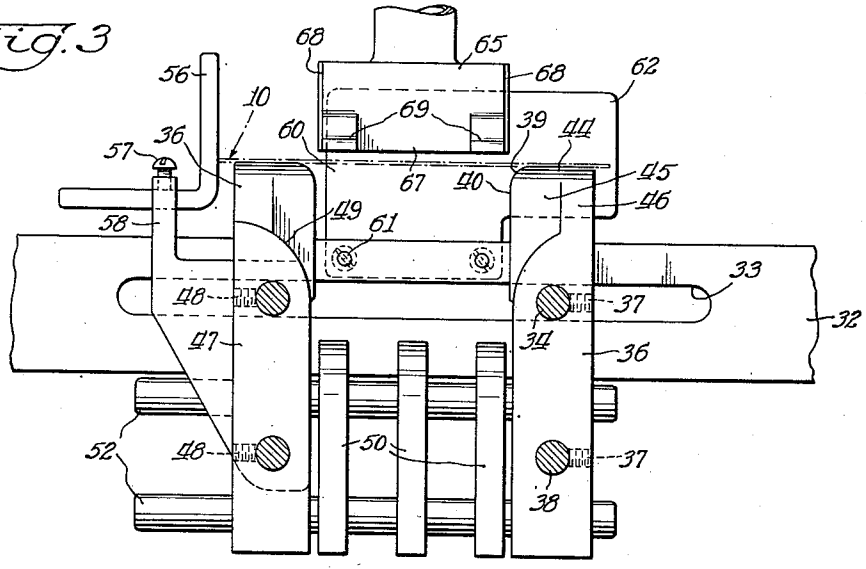


Fig. 5

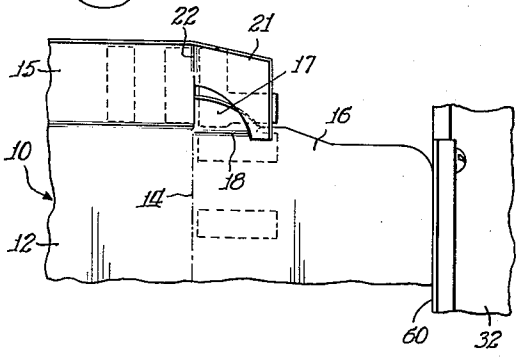


Fig. 7

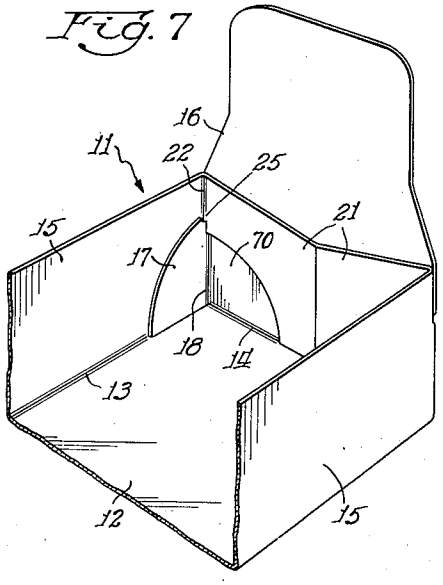
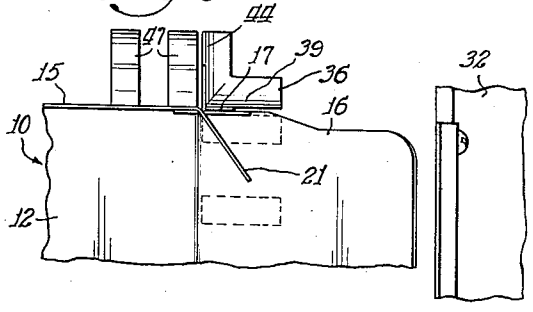


Fig. 6



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UNITED STATES PATENT OFFICE

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MACHINE FOR SETTING UP CORNER LOCKING TRAYS

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Application February 20, 1948, Serial No. 9,925

8 Claims. (Cl. 93—51)

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This invention relates, generally, to machines for setting up cardboard containers and it has particular relation to machines for setting up corner locking containers or trays of the type disclosed in copending application Serial No. 788,789, filed November 29, 1947, and assigned to the assignee of this application.

In said copending application several modifications of corner locking cardboard containers or trays are disclosed. They may be formed from suitably prepared flat blanks that are scored and cut to provide a bottom panel with side and end walls hinged at the score lines that define the boundary of the bottom panel. The end walls have contiguous locking tabs arranged to interfit with overlying end flaps that are contiguous with the side walls for the purpose of holding the container or tray in the set up condition without requiring the use of an adhesive or additional holding means to effect the same. The present invention has to do particularly with a machine for setting up such blanks to form containers or trays.

Among the objects of this invention are: To set up a container or tray from such a blank by the movement of a plunger into a throat, the former acting on the bottom panel and moving the same through the latter while the locking tabs and end flaps are moved into locking engagement as the side and end walls are set up; to fold the locking tabs and end flaps toward the planes of their final positions before the side and end walls are moved out of coplanar position with the bottom panel; to fold the locking tabs into such positions that they can be moved subsequently with the end walls along the inside of the side walls; to undercut the elements that fold the locking tabs and end flaps so as to permit folding thereof without interference; to provide projections on the ends of the plunger to form sharp corners in the container or tray; to provide recesses on the sides of the plunger to permit the end tabs to be inserted between the plunger and the inside of the side walls; to form the sides and ends of the throat by spaced fingers that are flared outwardly to facilitate entry of the blank into the throat; and to support the sides and ends of the throat and the holding elements adjustably for the purpose of accommodating containers of different dimensions.

Other objects of this invention will, in part, be obvious and in part appear hereinafter.

Accordingly, the invention is disclosed in the embodiment thereof shown in the accompanying

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drawings and it comprises the features of construction, combination of elements and arrangement of parts which will be exemplified in the construction hereinafter set forth and the scope of the application of which will be indicated in the appended claims.

For a more complete understanding of the nature and scope of this invention reference can be had to the following detailed description, taken together with the accompanying drawings, in which:

Figure 1 is a top plan view of the adjustable throat which forms a part of the machine for setting up blanks for corner locking containers or trays, one form of blank being shown by broken lines;

Figure 2 is a detail sectional view taken, generally, along the line 2—2 of Figure 1;

Figure 3 is a detail sectional view taken, generally, along the line 3—3 of Figure 1;

Figure 4 is a top plan view of one end of a blank to be set up in the machine shown in the preceding figures, the blank being shown flat with the locking tabs and end flaps shown in position for folding by the folding elements located at the corners of the throat;

Figure 5 is a view similar to Figure 4 and showing how one end flap and one locking tab are folded by the associated folding element as the bottom panel of the blank is moved toward the throat;

Figure 6 is a view, similar to Figure 5 but showing the locking tab folded into the plane of its final position with the associated end flap folded forwardly of the adjacent end wall and the latter being folded to the set up position where the locking tab which is moved along the inside of the adjacent side wall will be interlocked with the end flap; and

Figure 7 is a perspective view of one end of the completed container or tray which has been set up by the machine shown in Figures 1, 2 and 3 following the steps illustrated in Figures 4, 5 and 6.

Referring now particularly to Figures 4 and 7 of the drawings it will be noted that the reference character 10 designates, generally, in Figure 4 one end of a flat blank that is arranged to be set up to form a rectangular container or tray one end of which is indicated, generally, at 11 in Figure 7. Since the ends of the blank 10 and container or tray 11 are duplicates, only one is shown. The blank 10 and container or tray 11 constitute one form of the tray construction disclosed in the copending application above re-

ferred to. It is shown here for illustrative purposes only, it being understood that other corner locking tray constructions, such as those shown in said copending application, also can be set up using the machine therefor which is to be described in detail hereinafter.

It will be observed that the blank 10 includes a generally rectangular bottom panel 12 that is bounded by score lines 13 and 14, only one of the latter being shown. Side walls 15 are contiguous with the bottom panel 12 and are arranged to be folded perpendicular thereto along the score lines 13. Similarly, end walls 16, only one of which is shown, are arranged to be folded along score lines 14 to perpendicular position with respect to the bottom panel 12. In order to hold the side and end walls 15 and 16 in interlocking relation each of the end walls 16 has a locking tab 17 at each end which is contiguous therewith and is arranged to be folded along score lines 18 which are offset inwardly with respect to the score lines 13. The purpose of this offset is to permit the locking tabs 17 to be located on the insides of the side walls 15 when the container or tray 11 is in the set up position. Each of the locking tabs 17 is severed from the contiguous portions of the side walls 15 by cuts 19 which are located as projections of the score lines 14. The locking tabs 17 are severed by cuts 20 from end flaps 21 which, as shown, extend around the locking tabs 17. The cuts 20 preferably are arcuate as illustrated. The end flaps 21 are contiguous with the side walls 15 and are arranged to be folded relative thereto along score lines 22 which constitute extensions of the cuts 19 and the score lines 14.

With a view to locking the tab 17 to the end flap 21 when the container or tray 11 is set up, a short arcuate cut 24 is provided between the score line 18 and the cut 23. As shown in Figure 7, when the locking tab 17 is adjacent the side wall 15 and the end flap 21 is adjacent the end wall 16, a notch 25 is provided as a result of the provision of the arcuate cut 24 with which the end flap 21 interfits. This serves to lock the side walls 15 to the end walls 16 without requiring the use of adhesive or separate locking means.

As indicated above, this invention has to do particularly with setting up blanks, such as the blank 10, to form containers or trays, such as the container or tray 11. The device for accomplishing this purpose will be described now.

Referring now particularly to Figures 1, 2 and 3 of the drawings, it will be observed that the reference character 30 designates, generally, a throat which is generally rectangular and is slightly larger than the dimensions of the bottom panel 12 so as to receive the same therethrough in a manner to be described. The throat 30 is arranged to cooperate with a plunger that is indicated, generally, at 31 in Figures 2 and 3. It will be understood that the throat 30 may be stationarily mounted and that the plunger 31 may be arranged to be reciprocated, by any suitable means, into and out of the throat 30. In the drawings the throat 30 is illustrated as being positioned underneath the plunger 31 so that the latter moves downwardly in the direction indicated by the arrow 31' in Figure 2 in order to set up the blank 10 in the throat 30 in a manner to be described. However, it will be understood that the plunger 31 can be mounted stationarily with the throat 30 being movably mounted or

both may be mounted for relative movement. Also, it will be understood that the relative movement may take place in a horizontal rather than a vertical direction if desired.

As shown in the drawings frame members 32, in the form of angle iron, may be provided for mounting the throat 30. It will be understood that any suitable means can be provided for supporting the frame members 32. The upright portions of the frame members 32 are provided with longitudinally extending slots 33 in order to permit variation in the spacing of threaded rods 34 that extend therethrough and which may be clamped thereto by nuts 35. The threaded rods 34 serve to support the throat 30 which includes the parts forming the same that will be described now.

At each corner of the throat 30 there is provided a folding element 36 that may be in the form of an upright angle one leg of which is supported by one of the threaded rods 34. Set screws 37, Figure 3, serve to hold the folding elements 36 in position along the rods 34. These set screws also serve to clamp the folding elements 36 to transverse rods 38 which extend through their lower portions for suitably guiding the same and holding them erect.

As illustrated in Figure 2 each of the folding elements 36 has a curved face 39 which merges with a raised section 40 and a recessed section 41 therebeyond. The curved face 39 is provided to initiate the swinging movement of each of the locking tabs 17, as shown in Figure 5, when the blank 10 is moved downwardly toward the throat 30 by the plunger 31. The raised section 40 serves to complete the movement of the locking tab 17 at each of the corners to the upright position, shown in Figure 6, where it then can be swung with the end wall 16 along the inside of the side wall 15. The recessed section 41 insures that the ends of the end walls 16 are not engaged by the folding elements 36.

As shown in Figure 3 the faces of the folding elements 36 which cooperate with the end flaps 21 are shaped somewhat differently than the faces thereof which cooperate with the locking tabs 17. A curved face 44 is provided at the upper end which, when the blank 10 is moved into the throat 30, causes the end flap 21 to be swung about the score line 22 as shown in Figure 5. This face of the folding elements 36 has a recessed section 45 which clears the ends of the side walls 15. A raised section 46 is provided for engaging the portion of the end flap 21 which is contiguous with the side wall 15 to continue the movement thereof toward a position at right angles to the side walls 15. However, as will appear presently, the movement of the end flaps 21 to the perpendicular position with respect to the side walls 15 is not completed by the folding elements 36.

As shown in Figures 1, 2 and 3 of the drawings, the side walls of the throat 30 are formed by side fingers 47 which are located in spaced relation along the rods 34 and 38 and are secured thereto by set screws 48. The upper ends 49 of the side fingers 47 are curved or flared outwardly to facilitate entry of the bottom panel 12 of the blank 10 into the throat 30.

The end walls of the throat 30 are formed by end fingers 50 which may be secured by set screws 51 to transverse rods 52 adjustably mounted by certain of the set screws 51 in the other legs of folding elements 36, in the same manner as the

rods 38 are mounted. The upper ends 53 of the end fingers 50 are curved or flared outwardly for the same purpose that the upper ends 49 of the side fingers 47 are correspondingly shaped.

It will be apparent now that the size of the throat 30 can be changed to accommodate blanks 10 of different dimensions. By loosening the proper set screws, it is possible to shift the positions of the folding elements 36 and also of the side fingers 47 and end fingers 50 as may be desired within the limits of the design of the machine. Of course, the nuts 35 are loosened to permit the proper positioning of the threaded rods 34 in the slots 33.

With a view to centering the blank 10 with respect to the side fingers 47, stops 56 may be provided in the form of wires which may be secured by set screws 57 to brackets 58 that, as shown in Figure 2, may be secured by set screws 59 to the rods 34 and 38. The blank 10 may be centered with respect to the end fingers 50 by means of end guides 60 which may be secured by screws 61 to the frame members 32. The end guides 60 have out-flared ends 62, as shown in Figure 1, to direct the blank 10 into proper position over the throat 30.

For each different size of bottom panel 12 a different plunger 31 should be employed. It will be noted that the plunger 31, in Figures 2 and 3, comprises a rectangular head 65 having depending side flanges 66 and end flanges 67. It will be understood that these flanges 66 and 67 conform generally to the rectangular shape of the bottom panel 12 with the outer edges thereof extending along and slightly inside of the score lines 13 and 14.

It will be observed that the side flanges 66 have recesses 68 near the ends. The recesses 68 are provided to permit the locking tabs 17 to be swung along the insides of the side walls 15 as shown in Figure 6 when the end walls 16 are swung toward the locking position by engagement therewith by the side fingers 47. The end flanges 67 have projections 69 which are arranged to interfit with the space 70, Figure 7, that is provided as a result of the movement of the locking tab 17 away from the end flap 21. Since the projections 69 abut the end walls 16 in this manner, sharp corners are provided for the container or tray 11 as shown in Figure 7.

The manner in which the rectangular container or tray 11 is set up from the blank 10 with the end and side walls interlocked will be apparent now. The blank 10 is placed in proper position on the throat 30 as indicated in Figures 1, 2 and 3 of the drawings. The plunger 31 is then moved in the direction indicated by the arrow 31' toward the throat 30 where the side and end flanges 66 and 67 engage the bottom panel 12 and move the same toward the throat 30. The folding elements or corner posts 36 swing the locking tabs 17 and end flaps 21, as shown in Figure 5, the locking tabs 17 being swung to a perpendicular position with respect to the associated end wall 16. Since the upper edges of the side walls of the throat 30 formed by the side fingers 47 are above the upper edges of the end walls of the throat 30 formed by the end fingers 50, the side walls 15 are first swung to positions perpendicular to the bottom panel 12, as shown in Figure 6, before any movement of the end walls 16 takes place relative to the bottom panel 12. It will be observed in Figure 6 that the end flaps 21 project into the path of the end wall 16 as it is moved to a perpendicular position with

respect to the bottom panel 12 on engagement with the side fingers 50. During this movement of the end walls 16, the locking tabs 17 are swung through an extension of the cut 19 between the adjacent portions of the side walls 15 and end flaps 21. In the full set up position the notches 25 interfit with the end flaps 21, as shown in Figure 7, since the length of each of the locking tabs 17 along the score line 18 is greater than its length along the cut 19.

The plunger 31 continues to move through the throat 30 in order to discharge the container or tray 11 that has been set up thereby at the discharge end thereof. Suitable conveyor means can be provided, as will be understood readily, for carrying away the completed containers or trays 11 as they are ejected from the throat 30.

Since certain changes can be made in the foregoing construction and different embodiments of the invention can be made without departing from the spirit and scope thereof, it is intended that all matter shown in the accompanying drawings and described hereinbefore shall be interpreted as illustrative and not in a limiting sense.

What is claimed as new is:

1. In a machine for setting up a rectangular container from a flat paper board blank having a bottom panel and contiguous end and side walls with the end walls having contiguous locking tabs at the corners between the same and the side walls and the side walls having contiguous end flaps around the locking tabs, in combination, a rectangular throat having an opening of slightly greater cross-sectional area than said bottom panel with its sides higher than its ends, folding elements at the corners of said throat extending above its sides for initially receiving said blank thereon and engaging said locking tabs and end flaps, each folding element having a projection at its inner side positioned in a plane parallel to the adjacent side of said throat and spaced inwardly therefrom to engage the adjacent locking tab and direct said tab along the inside of the adjacent side wall, and a rectangular plunger movable into said throat and arranged to engage said bottom panel to move the same into said throat whereby said folding elements first cause said locking tabs and end flaps to swing relative to their end and side walls, then said sides of said throat cause said side walls to swing to a perpendicular position relative to said bottom panel, and finally said ends of said throat cause said end walls to swing to a perpendicular position relative to said bottom panel carrying therewith said locking tabs and said end flaps and moving the former into locking engagement with the latter.

2. In a machine for setting up a rectangular container from a flat paper board blank having a bottom panel and contiguous end and side walls with the end walls having contiguous locking tabs at the corners between the same and the side walls and the side walls having contiguous end flaps around the locking tabs, in combination, a rectangular throat having an opening of slightly greater cross-sectional area than said bottom panel with its sides higher than its ends, folding elements of approximately L cross section at the corners of said throat extending above its sides for initially receiving said blank thereon and engaging said locking tabs and end flaps, each folding element having a projection at its inner side positioned in a plane parallel to the adjacent side of said throat and spaced inwardly

therefrom to engage the adjacent locking tab and direct said tab along the inside of the adjacent side wall, the ends of the elements for folding said locking tabs being located in the same plane as the ends of the elements for folding said end flaps, and a rectangular plunger movable into said throat and arranged to engage said bottom panel to move the same into said throat whereby said folding elements first cause said locking tabs and end flaps to swing relative to their end and side walls, then said sides of said throat cause said side walls to swing to a perpendicular position relative to said bottom panel, and finally said ends of said throat cause said end walls to swing to a perpendicular position relative to said bottom panel carrying therewith said locking tabs and said end flaps and moving the former into locking engagement with the latter.

3. In a machine for setting up a rectangular container from a flat paper board blank having a bottom panel and contiguous end and side walls with the end walls having contiguous locking tabs at the corners between the same and the side walls and the side walls having contiguous end flaps around the locking tabs, in combination, a rectangular throat having an opening of slightly greater cross-sectional area than said bottom panel with its sides higher than its ends, folding elements at the corners of said throat extending above its sides for initially receiving said blank thereon and engaging said locking tabs and end flaps, each folding element having the side which engages the adjacent locking tab undercut at the portion thereof beyond said tab and the side which engages the adjacent end flap undercut at the portion juxtaposed to the adjacent locking tab, and a rectangular plunger movable into said throat and arranged to engage said bottom panel to move the same into said throat whereby said folding elements first cause said locking tabs and end flaps to swing relative to their end and side walls, then said sides of said throat cause said side walls to swing to a perpendicular position relative to said bottom panel, and finally said ends of said throat cause said end walls to swing to a perpendicular position relative to said bottom panel carrying therewith said locking tabs and said end flaps and moving the former into locking engagement with the latter.

4. In a machine for setting up a rectangular container from a flat paper board blank having a bottom panel and contiguous end and side walls with the end walls having contiguous locking tabs at the corners between the same and the side walls and the side walls having contiguous end flaps around the locking tabs, in combination, a rectangular throat having an opening of slightly greater cross-sectional area than said bottom panel with its sides higher than its ends, folding elements at the corners of said throat extending above its sides for initially receiving said blank thereon and engaging said locking tabs and end flaps, and a rectangular plunger movable into said throat and arranged to engage said bottom panel to move the same into said throat whereby said folding elements first cause said locking tabs and end flaps to swing relative to their end and side walls, then said sides of said throat cause said side walls to swing to a perpendicular position relative to said bottom panel, and finally said ends of said throat cause said end walls to swing to a perpendicular position relative to said bottom panel carrying therewith said locking tabs and said end flaps and moving the former into locking engagement with the latter, said plunger having projections on its ends to fit against said end walls in the spaces below said end flaps to form sharp corners in the container and recesses in its sides to permit said end tabs to be inserted between said plunger and the inside of said side walls.

5. In a machine for setting up a rectangular container from a flat paper board blank having a bottom panel and contiguous end and side walls with the end walls having contiguous locking tabs at the corners between the same and the side walls and the side walls having contiguous end flaps around the locking tabs, in combination, a rectangular throat having an opening of slightly greater cross-sectional area than said bottom panel with its sides higher than its ends, folding elements at the corners of said throat extending above its sides for initially receiving said blank thereon and engaging said locking tabs and end flaps, each folding element having the side which engages the adjacent locking tab positioned in a plane parallel to the adjacent side of said throat and spaced inwardly therefrom to direct said tab along the inside of the adjacent side wall, and a rectangular plunger movable into said throat and arranged to engage said bottom panel to move the same into said throat whereby said folding elements first cause said locking tabs and end flaps to swing relative to their end and side walls, then said sides of said throat cause said side walls to swing to a perpendicular position relative to said bottom panel, and finally said ends of said throat cause said end walls to swing to a perpendicular position relative to said bottom panel carrying therewith said locking tabs and said end flaps and moving the former into locking engagement with the latter, said plunger having projections on its ends to fit against said end walls in the spaces below said end flaps to form sharp corners in the container and recesses in its sides to permit said end tabs to be inserted between said plunger and the inside of said side walls.

6. In a machine for setting up containers from paper board blanks, two spaced parallel frame members, two spaced parallel supporting side rods extending between said frame members mounted thereon for adjustment toward and away from each other, two corner folding elements mounted on each of said rods for adjustment toward and away from each other, said elements being arranged in pairs with those of each pair aligned transversely of said rods, connecting end rods respectively extending between and adjustably mounted on said folding elements of each pair to accommodate adjustment thereof with said supporting rods, side folding means carried by said supporting rods, and end folding means carried by said end rods.

7. In a machine for setting up containers from paper board blanks, two spaced parallel frame members, two spaced parallel supporting side rods extending between said frame members mounted thereon for adjustment toward and away from each other, two corner folding elements of approximately L cross section adjustably mounted on each of said rods with the latter passing through the outer legs of said elements, said elements being arranged in pairs with those of each pair aligned transversely of said rods, two connecting end rods respectively extending between and adjustably mounted through the inner legs of said corner folding elements, side folding fingers adjustably secured on said side rods between said corner folding elements, and end fold-

ing fingers adjustably secured on said end rods between said corner folding element.

8. In a machine for setting up containers from paper board blanks, two spaced parallel frame members, two spaced parallel supporting side rods extending between said frame members mounted thereon for adjustment toward and away from each other, two corner folding elements adjustably mounted on each of said rods, said elements being arranged in pairs with those of each pair aligned transversely of said rods, a lower side connecting rod adjustably secured to said two corner folding elements on each of said supporting rods, two end connecting rods adjustably secured to said folding elements of each said aligned pair thereof, side folding fingers adjustably secured on each of said side supporting rods and the corresponding side connecting rod between said corner folding elements, and end folding fingers adjustably secured on each said two end connecting rods between said corner folding elements.

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REFERENCES CITED

The following references are of record in the file of this patent:

UNITED STATES PATENTS

Number	Name	Date
681,652	Gay	Aug. 27, 1901
1,161,996	Taylor	Nov. 30, 1915
1,900,892	Low	Mar. 7, 1933

FOREIGN PATENTS

Number	Country	Date
483,182	Germany	Sept. 27, 1929