Jan. 15, 1952 L. PERILLI 2,582,393

CARTON BLANK HANDLING MACHINE

Filed Feb. 25, 1949 2 SHEETS—SHEET 1

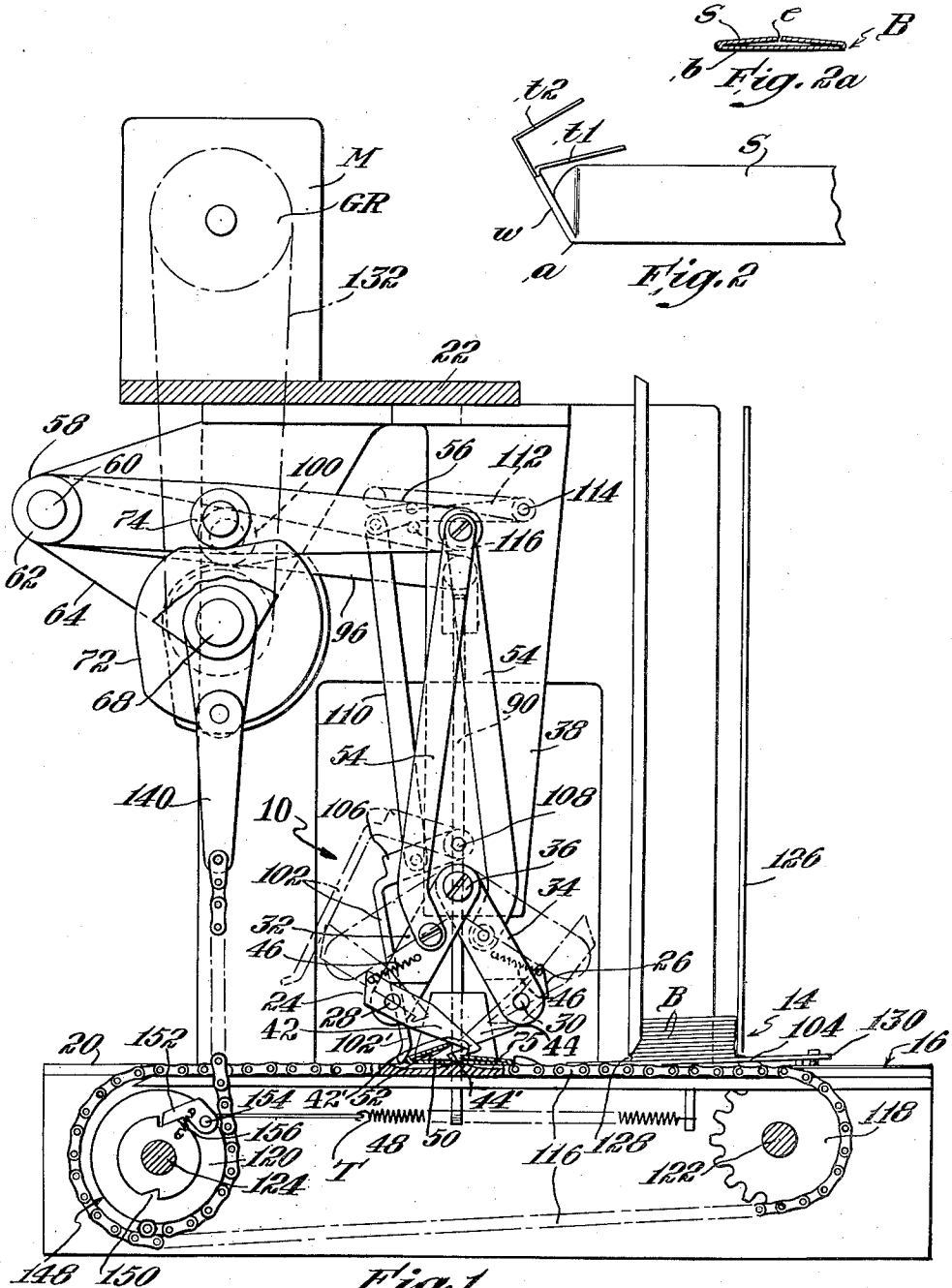


Fig. 1



Fig. 1a

Fig. 2

Fig. 2a

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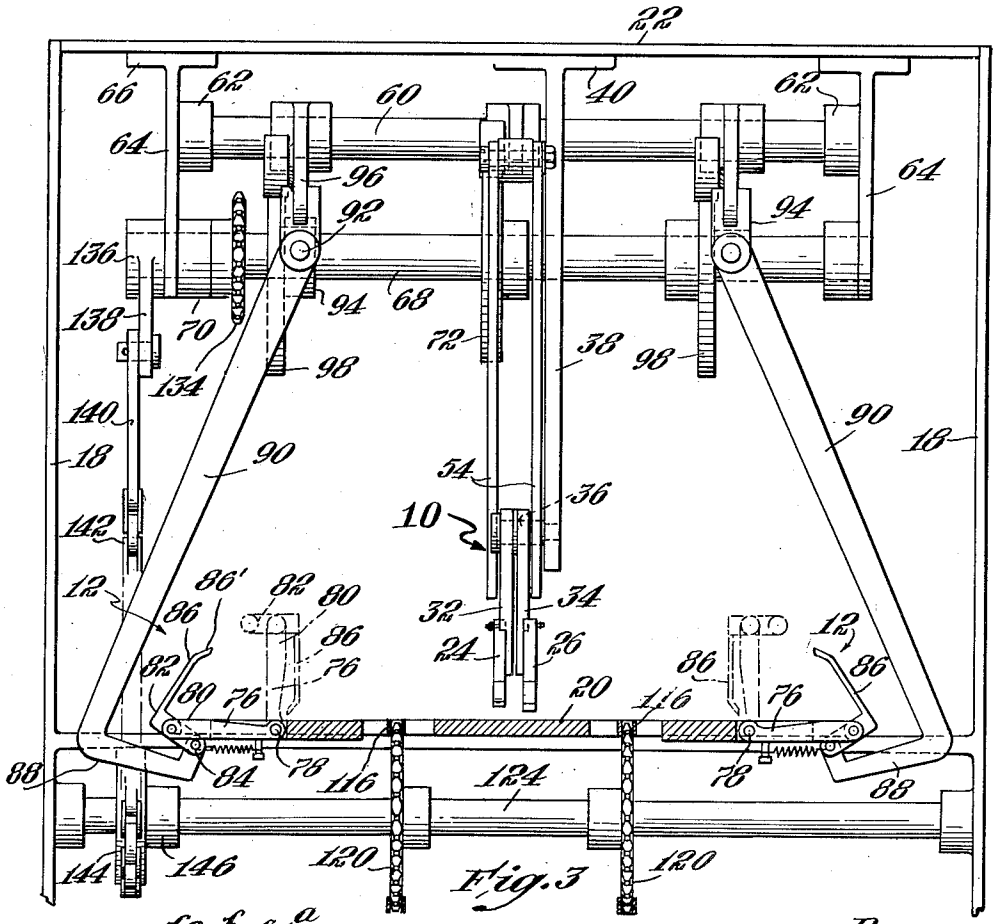


Fig. 3

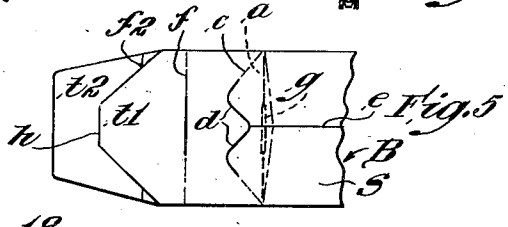


Fig. 5

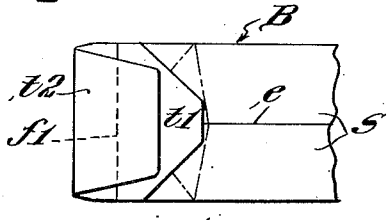


Fig. 6

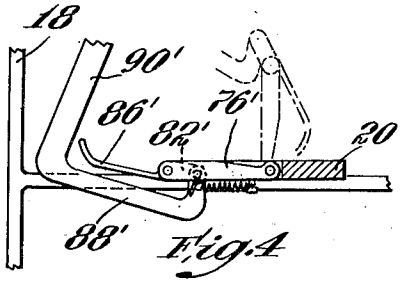


Fig. 4

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Patented Jan. 15, 1952

2,582,393

UNITED STATES PATENT OFFICE

2,582,393

CARTON BLANK HANDLING MACHINE

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Application February 25, 1949, Serial No. 78,375

16 Claims. (Cl. 93—53)

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This invention relates to box making machines and more specifically to machines for setting up box blanks of the kind having interlocking parts which when brought into operative position lock the parts in a set up position.

Box blanks for packaging many commodities are now available in flat form for setting up on the job. Such blanks are usually constructed so that the collapsed parts may be erected to form the desired commodity-receiving receptacle by a simple unfolding operation, there being interlocking tabs or tongues to hold the parts in their proper position when once set up.

The principal objects of this invention are to provide a semi-automatic machine for taking blanks of the foregoing type from a pile, setting them up rapidly, and delivering them set up to a place where they may be used. Other objects of the invention are to provide a machine for setting up box blanks wherein the upper edges of the prone side walls are very close together so that entrance of opening instrumentalities therebetween is difficult and for positively disengaging contiguous edges of blanks wherein the edges are formed by a common score line and tend to cling together by reason of imperforate cutting and/or friction between the cut edges. Still other objects are to provide a machine which is of simple construction, easily transportable, economical to operate and inexpensive to manufacture.

The blanks for which the present machine is particularly adapted have a bottom wall, inwardly folded substantially prone side walls and end walls connected to the side walls in such fashion that erection of the side walls partially erects the end walls. A locking slot penetrates the bottom at the intersection of each end wall therewith and locking tongues or flaps connected to the upper edge of the end walls are adapted to be forced inwardly between the erected side walls against the inside surface of the end walls and to enter the locking slots, thereby holding the parts set up.

Accordingly and as illustrated herein, the machine has a place for receiving flat blanks for setting up at which there are situated side wall erector members arranged successively to engage the side walls to deflect one side wall out of the plane of the other thereby to effect a vertical separation of the adjacent edges of the walls and then to engage the separated edges and draw them upwardly and outwardly to erect the walls. Preliminary deflection of one wall relative to the other is effected by a forwardly extending presser foot at the end of one of the erector members which contacts one of the side walls ahead of the other, depressing that wall, holding it down and entering below the other wall. Each member has a claw formed by a re-entrant notch situated near its end on the under side thereof so that as the

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members move inwardly the claws ride over the side walls, clear the edges, and the latter then snap into the notches. Retraction of the members thereafter pulls the edges upwardly and outwardly. To assist in separation of the edges there may be a depression at the place of setting up underlying the blank so that movement of the presser foot into engagement with the blank deflects it downwardly thereinto. There is driving mechanism for advancing the members to engage the claws with the edges of the side walls and for thereafter retracting them to erect the side walls. During erection of the side walls, the end walls are partially erected by their connection with the side walls and there are end wall erectors situated at the opposite ends of the blank at the place of setting up having portions underlying the end walls which may be lifted upwardly to vertical positions to raise the end walls to fully vertical positions and adjunctive folding fingers movable therewith and relative thereto to fold the locking tongues inwardly and downwardly into engagement with the inside of the end walls and to force the terminal edges of the tongues into the locking slots. Preferably there is a hopper of suitable capacity to receive a large quantity of flat blanks, a conveyor having spaced flights thereon for extracting one blank at a time from the hopper and transferring it to the place of setting up. To hold each blank securely in place there are stops movable into a position to engage the leading edge of each blank as it is moved into position, these latter being cooperable with the flights to resist lateral movement of the blank during the setting up operation. After setting up the foregoing instrumentalities are moved to inoperative positions, and the conveyor is advanced to carry the completed set-up box to a position for use and to transfer another flat blank from the hopper to the place of setting up.

The invention will now be described in greater detail with reference to the accompanying drawings in which:

Fig. 1 is a side elevation of the machine partly in section showing the side wall erector members in operative position just prior to erection of the walls;

Fig. 1*a* is a detail of an alternative form of edge engaging means;

Fig. 2 is an elevation of an end portion of a box partly set up showing the locking flaps or tongues before they are folded into the inside of the box;

Fig. 2*a* is a cross section of the folded blank;

Fig. 3 is an end view of the machine as seen from the rear, that is, from the point of view of an operator receiving completely set up boxes from the machine, showing the end wall erecting and folding members;

Fig. 4 is a modified form of end erecting and folding members for use in folding blanks wherein the tongues are not prefolded;

Fig. 5 is a plan view of one end of a flattened blank showing the end construction and the locking tongues prior to folding; and

Fig. 6 shows an end portion of the flat blank corresponding to Fig. 5 with the locking tongues prefolded.

Referring to Figs. 2, 2*a*, 5 and 6, the box blank B is shown as comprising a bottom *b* and infolded side walls *s*—*s*, the inner edges *e*—*e* of which are contiguous. As manufactured, the inner edges are formed by a single score line so that in a large percentage of the blanks manufactured the inner edges actually stick together partly from incomplete severance of the material and partly by frictional interlocking of the rough edges. The end walls *w*—*w* are constituted by two thicknesses of the material folded upwardly about a score line *a* formed in the bottom wall transversely thereof, the upper thickness being connected by the fold lines *c*—*c* to the side walls and severed therefrom along the lines *d*—*d*. The two thicknesses of the end walls are tapered to provide a pair of superposed tongues *t1* and *t2* foldable on the fold lines *f1* and *f2*. A through cut *g* is formed in the bottom wall in the score line *a* at the intersection of the bottom with the end walls and is adapted to receive the terminal edge *h* of the locking tongue *t1* to lock the parts in a set-up position. The tongue *t2* in the finished box normally occupies a horizontal position and has no function in holding the box set up. As supplied the blanks may have the tongues *t1*, *t2* folded out in the plane of the bottom (Fig. 5) or they may be folded in as in Fig. 6.

To set up the aforesaid blank the side walls *s*—*s* are spread and erected to vertical positions. Through their connections with the end walls *w*—*w* the latter are raised to partially erected positions as shown in Fig. 2. To complete the set up the end walls are pushed up to completely vertical positions and the tongues *t1*, *t2* are bent inwardly and downwardly to engage the terminal edge *h* of the tongue *t1* in the slot *g*. Setting up of blanks of the aforesaid character may conveniently be carried out in the machine which will now be described with reference to Figs. 1, 3 and 4.

As illustrated the machine comprises primarily side wall erector means 10 (Fig. 1), end wall erector means 12 (Fig. 3), storage and conveyor means 14 (Fig. 1) for moving blanks one at a time to the foregoing instrumentalities, and a frame 16 for supporting the parts together with means for operating the parts in proper relation to each other.

The frame comprises vertically spaced side walls 18—18 between which are supported vertically spaced, horizontally disposed plates 20 and 22. The plate 20 is spaced from the bottom edges of the side walls to provide a bed upon which may be received the blanks to be operated upon and to provide a subjacent space for part of the operating mechanism. The upper or head plate 22 has for its purpose to support driving elements both above and below it. The side walls, bed plate and head plate are rigidly secured together, for example, by welding.

The side wall erector means 10 comprises a pair of members 24 and 26 pivotally supported at 28 and 30 at the lower ends of a pair of arms 32 and 34 which in turn are supported to turn on a common stud 36, the latter being fixed in a

horizontal position to a vertically disposed plate 38, the upper end of which is provided with a flange 40 by which it is welded to the under side of the head plate 22. The erector members 24 and 26 are provided at their free ends with re-entrant notches 42 and 44 respectively so that they have claws 42' and 44' and these members are normally held in given positions with respect to the arms 32 and 34 by light springs 46 connected at one end to the members and at the opposite ends to the arm. The springs urge the claw ends of the members downwardly with respect to their pivots of support. One of the erector members 26 is shaped somewhat differently from the other in that its claw 44' has a forwardly and downwardly extending presser foot 48 which has a flat surface 50 and an angularly disposed flat surface 52 forming a plow forward of the re-entrant notch 42, the purpose of which will appear hereinafter.

In an alternative form, as shown in Fig. 1*a*, the members 24 and 26 may have latches 42'' pivoted at their free ends in place of the foregoing claws which will gravitate to engage the edge when they clear the same. Connecting rods 54 are fastened to the arms 32 and 34 at their lower ends and at their upper end to the forward end of an arm 56, the rear end 58 of which is pivotally supported on a shaft 60 horizontally disposed at the rear part of the machine for rotation in bosses 62 formed on spaced vertically disposed plates 64, the upper edges of which are provided with flanges 66 by which they are welded to the head plate 22. Below the shaft 60 is a second shaft 68 arranged horizontally to turn in bearings 70 formed in the plates 64. A cam 72 is fastened to the shaft 68 and has contact with a cam follower 74 fastened to the arm 56 so that rotation of the cam 72 moves the arm 56 in a manner to advance the erector members and to retract them as will be described hereinafter.

As thus constructed and with a flat blank disposed in position upon the bed plate 20 below the side wall erecting members, the cam 72 is rotated to move the erector members 24 and 26 from an upwardly retracted position, shown in dotted lines in Fig. 1, downwardly from opposite sides of the blank resting on the support toward each other. Since the member 26 is provided with the presser foot 48 which extends forwardly from the pivot point of the member 26 a greater distance than does the claw of the member 24 from its pivot point, the presser foot 48 comes into contact with the side wall of the blank toward which it is advancing ahead of the claw 42'. Contact of the presser foot with the wall *w* of the blank depresses it relative to the other side wall so as to separate their contiguous edges *e*—*e*. This will afford a positive separation of the edges which may be stuck together partially by failure of the cutting member in the blanking operation to cut cleanly through or by frictional engagement of the edges so that the unpressed wall springs upwardly providing a gap through which the plow portion of the presser foot may pass as the members continue to advance toward each other. The surface 50 holds the wall below it pressed against the bottom of the box blank and the inclined surface supports the under side of the opposite wall in an inclined position. The members continue to advance until their claws clear the inner edges of the walls over which they are moving whereupon the walls snap upwardly by their inherent resilience into the re-entrant notches. At this point the rota-

tion of the cam begins to retract the members laterally and upwardly in opposite directions and as they recede the re-entrant notches engaging the edges of the walls erect the walls to vertical positions. The cam then retains the erector members in this position while the end walls are erected and the locking tongues are folded as will appear hereinafter.

To assist in a positive and complete separation of the edges there may be a depression 75 in the bed plate located at the rear side of the center line bisecting the place of setting up and substantially midway between the opposite sides thereof so that as the presser foot moves into engagement with the blank the portion of the blank immediately thereunder is pressed downwardly into the depression.

The end wall erector means 12 is comprised of a pair of spaced flat plates 76 set into slots in the bed plate and pivotally supported therein at one end on pins 78. The plates are spaced at opposite sides of the bed plate at a distance corresponding to the longitudinal dimension of the blank between the score lines *a—a* which divide the bottom from the ends, and underlie the end wall portions of the blank. Each plate has at its forward end a pair of spaced fingers 80 between which is pivotally mounted an arm 82 having a tail piece 84 and a right angularly disposed finger 86 situated at opposite sides of its pivot. There is connected to the tail piece the foot 88 of a link 90, the upper end of which is pivotally connected at 92 to a block 94 slotted to embrace and be pivotally secured to the forward end of an arm 96. The rear end of each arm 96 is mounted to turn freely on the shaft 60. On the shaft 68 there are mounted a pair of cams 98, one for each of the arms 96, and each arm 96 carries a follower 100 for engagement with a cam 98. Rotation of the cam 98 will actuate the arms 96 in a manner to lift the plates 76 about their pivots 78 to a substantially vertical position as shown in dotted lines in Fig. 3 and then to tilt the arm 82 and hence the finger 86 inwardly and downwardly to a substantially parallel position where the fingers 86 are substantially parallel to the upstanding plates 76. The upward movement of the plates 76 moves the partially raised end walls *w—w* to vertical positions and the fingers 86 then fold the tongues *t1* and *t2* inwardly and downwardly so that the tongues *t1* are brought into contact with the inner sides of the end walls and the terminal edges *h* of the tongues *t1* are forced into the locking slots *g*. Preferably the terminal end of the finger 86 is bent inwardly at 86' to assist in forcing the edge *h* into the slot *g*.

It is desirable to hold the blank stationary during the setting up operation. Accordingly there is provided means in the form of a stop 102 (Fig. 1) which operates in conjunction with flights 104 to hold the blank stationary on the bed plate at the setting up position, the flight as will appear hereinafter being a part of a conveyor chain which delivers the blanks to the place of setting up.

The stop 102 comprises an elongate flat plate bifurcated at its lower end to provide spaced fingers 102'. The plates are connected to one end of an arm 106, the opposite end of which is pivotally supported at 108 on the plate 38. A link 110 is connected at its lower end to the arm 106 and the upper end of the link is connected to one end of an arm 112. The arm 112 is in turn pivotally connected at its opposite end at 114 to the

plate 38. The stop 102 is moved from an inoperative position as shown in dotted lines to an operative position by a pin 116 set into the arm 56 in a position to project laterally therefrom beneath the arm 112. Accordingly movement of the arm 56 in a direction to lower the side wall erector members 24 and 26 will simultaneously lower the link 110 and hence lower the stop 102 to its operating position as shown in Fig. 1 where the lower ends of the fingers 102' are situated close to the bed plate 20 in a position to engage the forward edge of a blank as it is moved into setting up position.

The flights 104 which operate in conjunction with the stop plate 102 to hold the blanks in position are carried by a pair of spaced chains 116 which embrace sprockets 118 and 120 mounted on horizontal shafts 122 and 124 respectively situated below the bed plate 20 forwardly and rearwardly of the machine and journaled in the lower part of the walls 18—18. The flights are spaced along the chains at intervals so that when one pair of flights engages the rear edge of a blank in its setting up position so as to hold its forward edge in contact with the stop plate 102, the succeeding pair of flights engages the rear edges of the next blank to be delivered to the place of setting up which is situated in a hopper at the front of the machine. As illustrated the hopper is fastened to the top side of the bed plate 20 and consists of a substantially rectangular open housing 126 which has inside cross sectional dimensions corresponding to the flattened blank so that a pile of the blanks may be placed in the hopper and will settle toward the bottom by gravity as the lowermost blanks are withdrawn. At the lower end of the hopper there is a discharge space 128 into which the lowermost blank may drop and through which the flights 104 may pass as the chains rotate thereby to carry the lowermost blank forwardly from beneath the hopper to the place of setting up. To assist in forward sliding movement of a blank from the space 128 and to provide a support for the lowermost blank there is disposed beneath the hopper and in the aforesaid space 128 a sloping plate 130, the latter having slots therein through which the flights 104 may pass. It is to be understood that while the hopper 126 is shown as containing a single stack of the blanks, it may be of such design as to contain a larger number of blanks perhaps in two stacks or three stacks suitably arranged so that one stack will be fed to the other as the blanks are exhausted from the first stack.

Operation of the machine as a whole is effected by means of a motor M fastened to the top side of the head plate 22 including a gear reduction unit GR and a chain drive 132 extending therefrom to a sprocket 134 fastened to the shaft 68. Rotation of the shaft 68 which carries the cam 72 and the cams 98 effects the proper movement of the side wall erectors and the end wall erectors in accordance with the foregoing description to separate and erect the side walls of the blank, then to fold the end walls upwardly and the tongues inwardly and downwardly to locking position, and thereafter to retract the aforesaid instrumentalities to out-of-the-way positions. Operation of the chains 116 as the instrumentalities are moved to an out-of-the-way position are effected as follows. A hub 136 is fixed to the outer end of the shaft 68 and turns continuously with the shaft. An arm 138 projects from the hub and has pivotally fastened to its free end

one end of a link 140 the opposite end of which is connected to one end of a chain 142. The chain 142 is wrapped partially around a sprocket 144 mounted to turn freely on the shaft 124 and is fastened to the rim of the sprocket. Adjacent to the sprocket and fastened to the shaft 124 is a hub 146. The hub 146 is driven intermittently by the sprocket through a one-way clutch 148 consisting of a pair of notches 150 formed in the hub and spring-pressed latches 152 pivotally connected at 154 to the sprocket and held in engagement with the surface of the hub by springs 156. Rotation of the shaft 68 reciprocates the link so that the chain is first drawn up and then is allowed to be drawn down as will appear hereinafter. On the upward movement of the link the sprocket is rotated to bring one of the latches 152 into a notch 150 whereupon the shaft 124 will be rotated in a direction to move the chains 116 a distance equal to the interval between adjacent flights on the chains. At this point the sprocket will be rotated in the reverse direction by a tension spring T one end of which is connected to the sprocket and the other end of which is connected to the under side of the frame. This is permitted by the down stroke of the link which permits the chain 142 to descend. At the end of its reverse movement the latch on the sprocket is in a position to pick up the next notch so that on the next upward stroke the shaft will be rotated again.

In Fig. 4 there is shown an alternative form of end wall erector member and tongue-bending finger which is adapted to set up a box wherein the tongues *t1*, *t2* have not been bent inwardly and hence are in substantially the same plane with the end walls at the time when the blank is delivered to the place of setting up, in contradistinction to a partly folded blank as shown in Fig. 6 for which the foregoing end wall erecting and folding members are provided. As therein shown the end wall erecting plates 76' are substantially the same form as shown heretofore. In contrast however the folding fingers 86' are connected to the arms 82' so that they extend substantially in the plane of the plate 76' to engage the under side of the tongue *t2* bent out flat. To afford room for the laterally extending fingers 86' the feet 88' are made longer. Operation of the end wall erecting plates 76' and infolding fingers 86' follows exactly that discussed above with reference to Fig. 3 and hence will not be recounted again herein.

In the operation of the machine the blanks are placed in the hopper 126 and the motor M is started whereupon the chains 116 rotate and transfer a blank from the bottom of the hopper 126 toward the place of setting up on the bed plate. At this time the holding plate 102 descends ahead of the advancing blank in a position to engage the forward edge of the blank as it is moved thereagainst by the flights on the chin. The blank is thus held by the stop and flights for operation thereon by the setting up instrumentalities. The side wall erector members 24 and 26 then descend toward the flat blank and the side wall erector 26 first engages the side wall opposite which it is situated pressing it downwardly to disengage its inner edge from the inner edge of the opposite side wall thereby to form a gap between these edges to permit entrance of the forward presser foot portion thereof and as the members advance their claws clear the inner edges of the walls, the walls snap up into the re-

entrant notches and are engaged thereby whereupon as the members are retracted the side walls are erected to substantially vertical positions. Vertical movement of the side walls draws the end walls to a partially inclined position whereupon the end wall erector members 76 begin to rise and to push the end walls to their vertical position. When in their vertical positions the folding fingers 86 begin to move inwardly and downwardly to fold the locking tongues *t1* inwardly against the inside of the end walls and to force the terminal edges *h* into the locking slots *g* thereby completing the erection of the box. Following this the instrumentalities are withdrawn from the operating position and the chain begins to move again to carry the set up box to the rear of the machine where it may be removed and simultaneously to move a new blank into a position of setting up.

It should be understood that the present disclosure is for the purpose of illustration only and that this invention includes all modifications and equivalents which fall within the scope of the appended claims.

I claim:

1. In a device for setting up box blanks wherein each blank has a bottom and side walls folded inwardly thereon to nearly prone positions with their top edges closely parallel, a place of setting up for receiving a flat blank, means at said place of setting up for deflecting one wall out of the plane of the other wall to effect a substantially vertical separation of said parallel edges, means for engagement with the vertically displaced edges and power operated means for effecting movement of said edge engaging means into engagement with said edges following separation thereof and for thereafter retracting them to erect the side walls.

2. In a device for setting up box blanks wherein each blank has a bottom and side walls folded inwardly thereon to nearly prone positions with their top edges closely parallel, a place of setting up for receiving a flat blank, means at said place of setting up for pressing one wall downwardly relative to the other to effect a substantially vertical separation of the parallel edges, claw members for engagement with the vertically separated edges, movable into engagement with said edges following the separation thereof, and power operated means for effecting movement of said claw members to engage the edges and for thereafter retracting them to erect the walls.

3. In a device for setting up box blanks wherein each blank has a bottom and side walls folded inwardly thereon to nearly prone positions with their top edges closely parallel, a place of setting up for receiving a flat blank, said place of setting up having a depression therein, means at said place of setting up for depressing one wall of the blank into the depression to effect a substantially vertical separation of the parallel edges, claw members for engagement with the vertically separated edges, movable into engagement with said edges following separation thereof, and power operated means for effecting movement of said claw members to engage said edges and for thereafter retracting them to erect the side walls.

4. In a device for setting up box blanks wherein each blank has a bottom and side walls folded inwardly thereon to nearly prone positions with their top edges closely parallel, a place of setting up for receiving a flat blank, erector members having edge engaging means near their ends,

means advancing the erector members inwardly along the surfaces of said walls toward said parallel edges to positions where said edge engaging means clear said edges, thereby to permit said edges to snap upwardly behind said edge engaging means, and means operable in advance of the movement of said edge engaging means to said positions for displacing one wall relative to the other to permit said edge engaging portion of one member to enter beneath the said other wall as it moves into said position to engage the edge of the one wall.

5. In a device for setting up box blanks wherein each blank has a bottom and side walls folded inwardly thereon to nearly prone positions with their top edges closely parallel, a place of setting up for receiving a flat blank, erector members having re-entrance notches, means for advancing the members inwardly toward said parallel edges of the walls to positions where the notches clear said edges, means yieldably urging said members downwardly toward the blank, means operable in advance of the movement of said notched portions of said members to said positions for displacing one wall relative to the other as the members approach said edges to effect substantially vertical displacement thereof and means for advancing said members to embrace the vertically spaced edges and thereafter to retract them to erect the side walls.

6. In a device for setting up box blanks wherein each blank has a bottom and side walls folded inwardly thereon to nearly prone positions with their top edges contiguous being formed by a common score line, a place of setting up the flat blank, means at said place of setting up having edge engaging elements arranged to be yieldably urged toward said blank and to be advanced inwardly above the walls toward and beyond the contiguous edges, and means operable in advance of the movement of said edge engaging elements to places to clear said edges to effect a vertical separation thereof sufficiently to permit one of said members to enter beneath the under side of one of the walls, and means for advancing said members to embrace the vertically spaced edges and thereafter to retract them to erect said side walls.

7. In a device for setting up box blanks wherein each blank has a bottom and side walls folded inwardly thereon to nearly prone positions with their top edges closely parallel, a place of setting up for receiving a flat blank, a pair of hooks arranged above and at opposite sides of the place of setting up, said hooks being movable inwardly and downwardly into engagement with the folded side walls of the blank resting at said place of setting up, means for effecting movement of said hooks into engagement with the side walls and across them for engagement with the edges of the side walls and a forwardly projecting nose at the extremity of one hook, increasing the length of said hook so that as the hooks are moved inwardly across the side walls, the nose engages one side wall of the blank before the opposed hook engages the opposite wall, depressing it relatively to the opposite wall, and then moves into the gap between the edges of the walls, and means for effecting movement of said hooks inwardly over the side walls until they engage the edges of the walls and for thereafter retracting the hooks in directions to erect the side walls.

8. In a device for setting up box blanks wherein each blank has a bottom and side walls folded inwardly thereon to nearly prone positions with their top edges closely parallel, a place of setting

up for receiving a flat blank, a pair of side wall erector members symmetrically arranged to advance inwardly and downwardly about a common axis, each of which has a hook, a presser foot forming a forwardly and downwardly extending prolongation of one hook, and means for advancing the members across the side walls until the hooks clear the parallel edges of the side walls and for thereafter retracting the members to erect the walls.

9. In a device for setting up box blanks wherein each blank has a bottom and side walls folded inwardly thereon to nearly prone positions with their top edges closely parallel, a pair of side wall erector members, arms supporting said members for swinging movement to and from each other about a common axis, edge engaging means carried by each member, a prolongation at the extremity of one member having a flat surface and an inclined surface said surfaces forming a wedge-shaped plow movable into engagement with one side wall ahead of said other member, said plow depressing the one wall and elevating the other wall and common means for effecting swinging movement of the arms toward each other to advance each member inwardly to a point where its edge engaging means clears an edge of a side wall and thereafter to retract the members to erect the side walls.

10. In a device for setting up box blanks wherein each blank has a bottom and side walls folded inwardly thereon to nearly prone positions with their top edges closely parallel, a place of setting up upon which a blank may be placed, said place having a depression at one side of the longitudinal center line of the blank, a pair of erector members supported to swing to and from each other at the setting up place, said members having edge engaging means near their free ends, a presser foot ahead of said edge engaging means on one member situated at the side of the depression, and means for advancing the members toward each other to cause the presser foot to depress that portion of the blank immediately thereunder into the depression until said edge engaging means clear said edges and for thereafter retracting the members to erect the side walls.

11. In a device for setting up box blanks wherein the blanks have a bottom and side walls folded inwardly thereon to nearly prone positions with their top edges closely parallel, a place of setting up for receiving a blank, conveyor means for transferring blanks one at a time from a stack of blanks to said setting up place, a stop at the place of setting up cooperable with the conveyor means to hold a blank at said place of setting p, a pair of setting up members arranged above and at opposite sides of the place of setting up, each of which has edge engaging means for engagement with an edge of a side wall, one of said members having a wiper associated therewith, and means for advancing each member simultaneously and at corresponding rates toward the blank to cause said wiper to depress one wall relative to the other to effect a vertical separation of said edges and for advancing said edge engaging means until each clears an edge of a side wall and for thereafter retracting said members to erect the side walls.

12. In a device for setting up blanks wherein each blank has a bottom, infolded side walls and outfolded end walls with terminal locking tongues, the end walls and side walls being connected so that erection of the side walls causes partial erection of the end walls and there being tongue-

receiving slots in the bottom at the inter-section of the bottom with said end walls comprising a place of setting up for receiving the blanks, a hopper containing a stack of blanks, a conveyor having flights therealong for extracting a blank from the hopper and transferring it to the place of setting up, a stop at the place of setting up movable into a position to engage the advancing edge of a blank as it arrives at the place of setting up and serving in cooperation with said flights on the conveyor to hold the blank during setting up, a pair of setting up members arranged to swing toward the blank, each member having edge engaging means associated therewith and one having a wiper associated therewith, means for advancing the members to cause said wiper to depress one side wall with relation to the other side wall and for moving the edge engaging means inwardly beyond said edges of the side walls and for thereafter retracting them to erect the side walls, and means for erecting the end walls of the blank to complete the setting up thereof.

13. In a device for setting up blanks wherein each blank has a bottom, infolded side walls and outfolded end walls with terminal locking tongues, the end walls and side walls being connected so that erection of the side walls causes partial erection of the end walls and there being tongue-receiving slots at the intersection of the bottom with said end walls, comprising side wall erector members having portions movable into contact with the exposed surfaces of the side walls in seriatim operable to depress one side wall relative to the other to effect vertical separation of the adjacent edges, hooks on said members movable into engagement with the separated edges following separation thereof, means for effecting movement of said members to effect the separation of said edges and erection of the side walls and end wall erectors operable to lift the partially raised end walls to vertical position and thereafter to fold the locking tongues downwardly into contact with the inside of the end walls.

14. In a device for setting up blanks wherein each blank has a bottom, infolded side walls and outfolded end walls with terminal locking tongues, the end walls and side walls being connected so that erection of the side walls causes partial erection of the end walls and there being tongue-receiving slots in the bottom at the intersection of the bottom with end walls comprising a place of setting up for receiving a flat blank, a pair of side wall erector members, edge engaging means associated therewith, situated above and at opposite sides of the longitudinal side walls of the blank, means for moving the side wall erector members to advance them into engagement with the walls in succession to engage said edge engaging means of each with an edge of a side wall and for thereafter retracting them to erect the side walls and simultaneously partially to lift the end walls, end wall erectors at the opposite ends of the place of setting up movable from the plane thereof angularly to vertical position, means for effecting angular movement of the end wall erectors to set the partially lifted end walls upright and folders carried by the end erectors movable when the end erectors reach their vertical position about axes parallel to the upper edges of end wall erectors inwardly and downwardly of the ends of the blank to fold the locking tongues into engagement with the inner surfaces of the end walls and to force their terminal edges into said tongue-receiving slots.

15. In a device for setting up blanks wherein each blank has a bottom, infolded side walls and outfolded end walls with terminal locking tongues, the end walls and side walls being connected so that erection of the side walls causes partial erection of the end walls and there being tongue-receiving slots in the bottom at the intersection of the bottom with end walls comprising side wall erector means operable to deflect one side wall relatively to the other to effect vertical separation of the adjacent edges, and thereafter to raise the side walls to vertical positions, means for effecting operation of said side wall erector means end wall erectors comprising plates lying in the plane of the place of setting up and underlying the end wall portions of the flattened blank, said plates being pivoted for movement about horizontal axes to substantially vertical positions for lifting the overlying end walls to vertical positions, fold fingers pivotally supported on the outer extremities of the plate movable therewith during elevation of the latter and embracing the locking tongues, said fold fingers being movable about their pivots when the plates are erected to a position inwardly and downwardly to fold the locking tongues inwardly and downwardly into engagement with the inside of the end walls and to press the terminal edge of the locking tongues into the locking slots, and means for effecting said movement of the end plates and folding fingers.

16. In a device for setting up box blanks wherein each blank has a box, infolded side walls and outfolded end walls with terminal locking tongues, the end walls and side walls being connected so that erection of the side walls causes partial erection of the end walls and there being tongue-receiving slots in the bottom at the intersection of the bottom with end walls, comprising side wall erector members operable to deflect one side wall relative to the other to effect vertical separation of the adjacent edges, and thereafter to erect the side walls, means for effecting operation of said side wall erector members end erectors comprising plates lying substantially in the plane of the place of setting up, underlying the end wall portions of the flattened blank, said plates being hinged at their inner ends for movement about horizontal axes to substantially vertical positions for lifting the end walls to vertical positions, fold fingers hinged to the outer ends of the plates and forming a prolongation thereof underlying the locking tongues, said fold fingers being pivotal relative to the plates, means for raising the plates about their hinges to vertical positions to erect the end walls and for thereafter depressing the fingers about their pivots inwardly and downwardly to fold the locking tongues against the inside of the end walls and to force the terminal edges of the tongues into the locking slots.

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