April 17, 1956 R. G. HAAS 2,741,957

CARTON ERECTING MACHINES

Filed Dec. 8, 1952 3 Sheets-Sheet 1

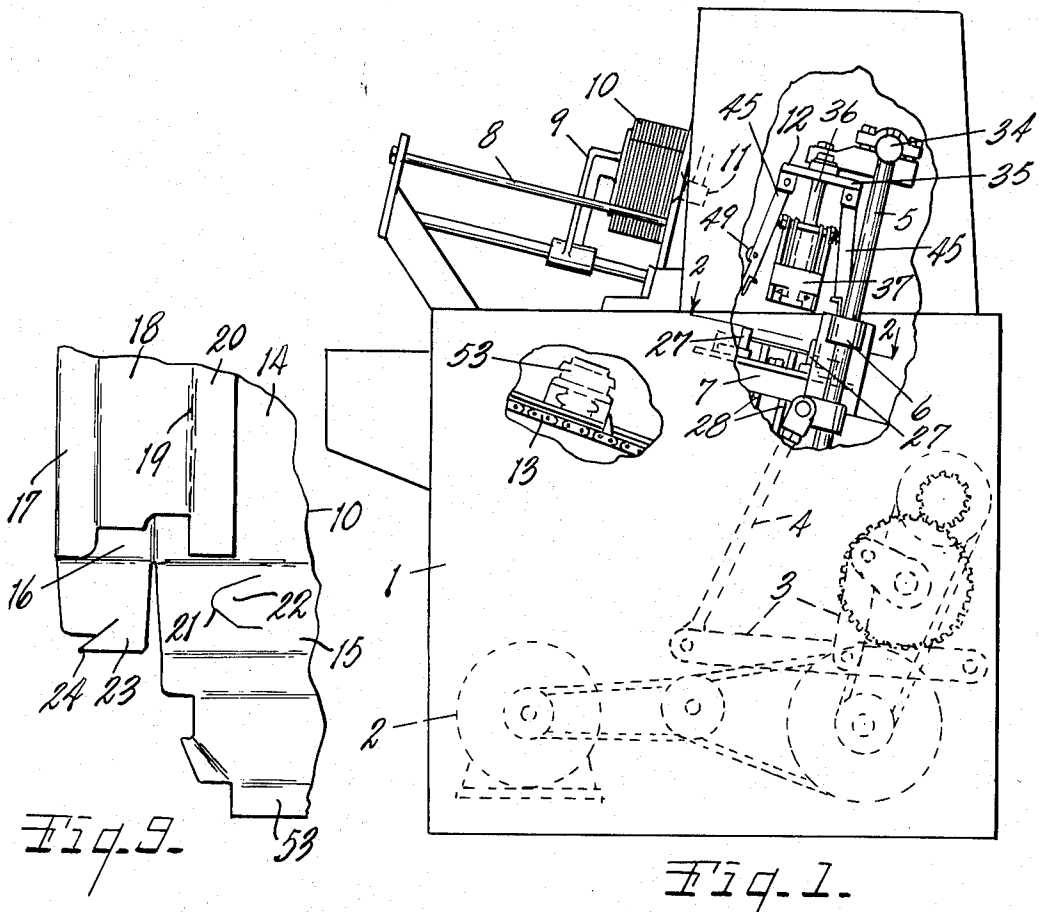


Fig. 1.

Fig. 3.

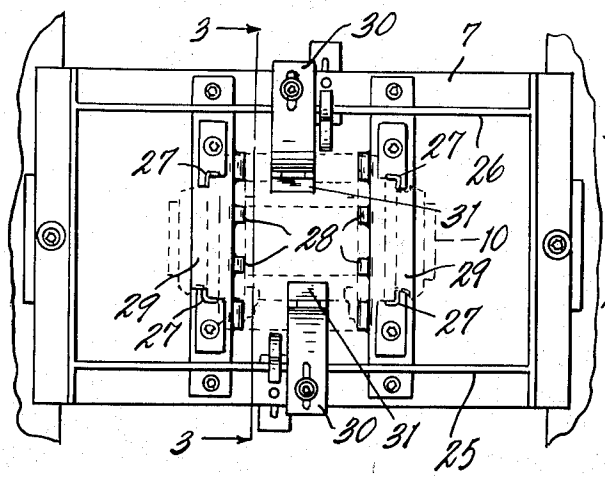


Fig. 2.

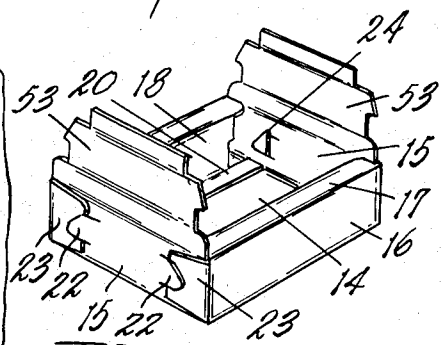


Fig. 8.

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CARTON ERECTING MACHINES

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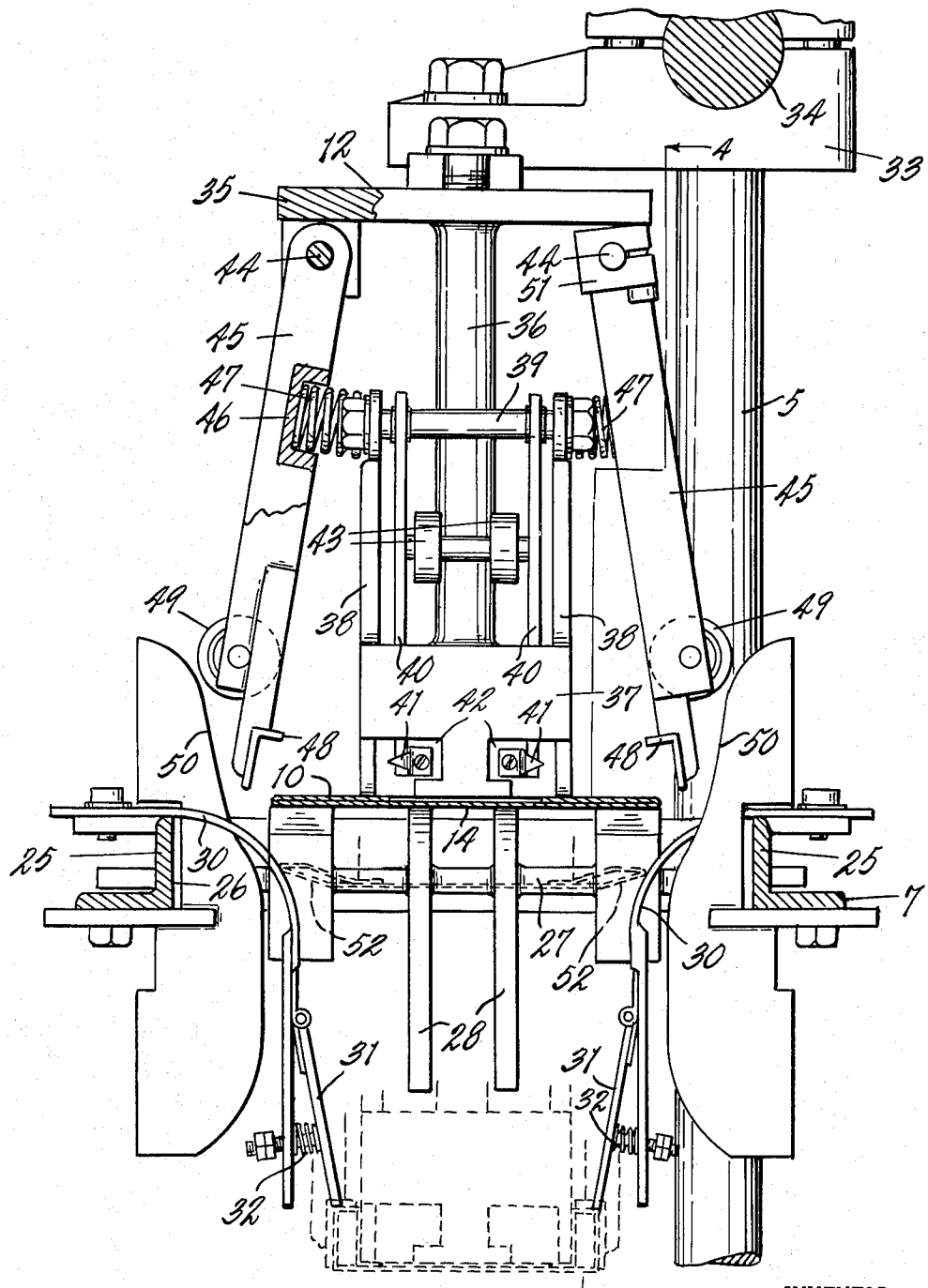


Fig. 3.

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CARTON ERECTING MACHINES

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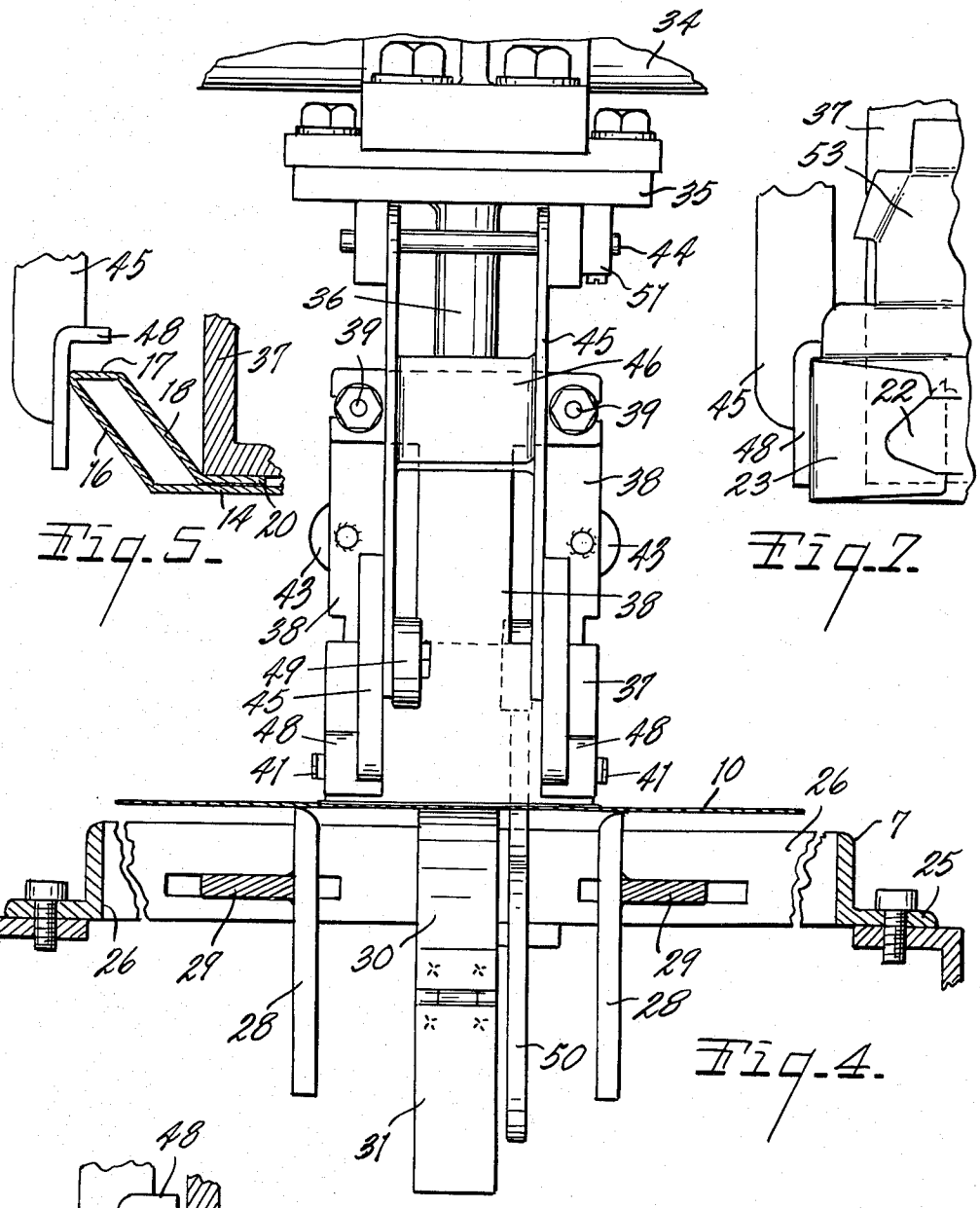


Fig. 4.

Fig. 5.

Fig. 7.

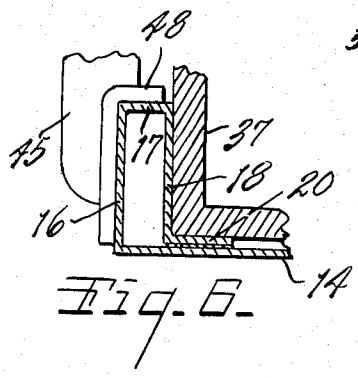


Fig. 6.

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United States Patent Office 2,741,957
Patented Apr. 17, 1956

2,741,957

CARTON ERECTING MACHINES

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Application December 8, 1952, Serial No. 324,685

11 Claims. (Cl. 93—51)

This invention relates to improvements in carton erecting machines.

The principal objects of this invention are:

First, to provide a machine which will rapidly erect side walls on a carton blank when the side walls each consist of spaced parallel elements so that the completed side walls form true rectangular hollow walls with square corners.

Second, to provide a machine for erecting hollow side walls on a carton blank and simultaneously folding corner flaps from the ends of the side walls into interlocking engagement with end walls on the carton.

Third, to provide an improved blank advancing head and side folding chute for a carton erecting machine that will accommodate carton blanks having opposite side walls folded double and secured to the body of the blank to be erected into hollow double side walls without bowing the blanks downwardly and interfering with the locking of corner flaps at the corners of the carton.

Fourth, to provide a blank advancing head for a carton erecting machine with laterally swingable arms and pressure elements that move inwardly of the carton as the blank is advanced through an erecting chute to press downwardly on the upper edges of the newly erected side walls and thus relieve the central portion of the carton and blank from part of the load applied thereto by the body of the blank advancing head.

Other objects and advantages of the invention will be apparent from a consideration of the following description and claims.

The drawings of which there are three sheets illustrate a highly practical form of the carton erecting machine.

Fig. 1 is a side elevational view of the machine partially broken away to illustrate the location of the elements therein.

Fig. 2 is a fragmentary plan view of the upper end of the carton erecting chute with a carton blank illustrated in dotted lines in position to be erected. The view is taken along the plane of the line 2—2 in Fig. 1.

Fig. 3 is an enlarged fragmentary transverse cross sectional view through the carton erecting chute and blank advancing head taken along the plane of the line 3—3 in Fig. 2. The blank advancing head is illustrated in full lines in partially retracted position while the dotted lines indicate progressively advancing positions of the head and blank.

Fig. 4 is a fragmentary longitudinal cross sectional view through the carton erecting chute taken along the plane of the line 4—4 in Fig. 3.

Fig. 5 is an enlarged fragmentary cross sectional view through the side erecting arm and a partially erected carton blank.

Fig. 6 is an enlarged fragmentary cross sectional view through the side erecting arm and a carton blank in the erected position of the blank.

Fig. 7 is an enlarged fragmentary side elevational view

of one corner of the erected carton and illustrating the construction of the corner flap lock of the carton.

Fig. 8 is a perspective view of the carton as erected by the present machine.

Fig. 9 is a fragmentary plan view of the carton blank adapted to be erected in the machine.

The general arrangement of the carton erecting machine is illustrated in Fig. 1 wherein a suitable body 1 contains a driving motor 2 and interconnected gear and crank mechanism 3 for vertically reciprocating the connecting rod 4. The connecting rod 4 reciprocates slide rods 5 carried in suitable guide bearings 6 at the opposite ends of an erected chute indicated generally at 7. An inclined hopper 8 and weight biased follower 9 are arranged to advance a stack of carton blanks 10 to a feed mechanism 11 that delivers carton blanks individually to the top of the erecting chute. A blank advancing head 12 is reciprocated by the slide rods 5 to advance each blank through the chute 7 and the side and end portions of the blank are erected and locked into side and end walls on the carton in passing through the chute. A conveyor 13 receives the erected cartons from the lower end of the chute and conveys them away for further forming or filling.

This invention is primarily concerned with the mechanism which adapts the foregoing structure to operate on carton blanks and cartons that have spaced inner and outer side walls on at least two opposite sides of the carton. As is best illustrated in Fig. 9, the carton blank comprises a flat bottom portion 14 having end forming flaps 15 on opposite ends thereof. The sides of the bottom portion 14 are integrally connected to side wall forming flaps 16 and the outer edges of the side wall flaps 16 are folded inwardly in top wall flaps 17 and inner side wall portions 18. The inner edges of the inner side wall portions are connected along the scored fold line 19 to flaps 20 that are glued to the bottom panel 14. The end flaps 15 are provided with curved slits 21 that outline deflectable locking flaps 22 and corner flaps 23 are carried on the ends of the outer side wall flaps 16. The corner flaps 23 have locking ears 24 that coact with the locking flaps 22 as will be described. It will be understood that the relative deflnition of the several flaps is for the purpose of description only and that the double walls could be provided along opposite edges of a blank having any dimension.

Mounted on top of the chute 7 is a platform 25 which in the present instance consists of a rectangular frame channel shaped in cross section. The frame forms a hole or throat 26 into the top of the chute generally and the blank feeding mechanism 11 is operative to deliver the carton blank 10 into upwardly facing flat supported engagement on the top of the platform. Guides 27 (see Figs. 1 and 2) properly orient the blank over the platform. Upright end rails 28 are adjustably carried on crossbars 29 extending through the sides of the throat 26 to form the ends of the chute. The end rails 28 project slightly above the rectangular frame 29, as illustrated in Figs. 3 and 5, and support the carton blank.

The sides of the platform frame 25 support the inwardly and downwardly bowed side rails 30 that extend into and form the sides of the carton erecting chute. At their inner ends the side rails 30 are provided with pivoted stripper fingers 31 biased inwardly of the chute by springs 32. As is best illustrated in Fig. 3, the side rails 30 are spaced apart further than the width of the cartons to be erected but are close enough together to cammingly engage the side edges of the blank as the blank is advanced therethrough. The end rails 28 are spaced apart by a distance approximately equal to the length of the erected carton.

The blank advancing head 12 consists of a bracket 33

carried by a cross rod 34 at the upper ends of the slide rods 5. The bracket 33 is bolted to a top plate 35 and the plate 35 is rigidly connected to a depending rod 36. The depending rod 36 is connected to a rectangular box like structure 37, the lower face of which is approximately equal in size to the bottom panel 14 of the carton blank within the end walls and inner side walls 18. Upstanding arms 38 on the sides of the box portion 37 form supports for transverse pivot shafts 39 at each end of the head. The shafts 39 carry depending locking arms 40 that support angle shaped locking fingers 41 in the openings 42 formed in the ends of the box portion 37. Follower rolls 43 carried by the arms 40 travel along the end rails 28 of the chute to press the arms 40 and fingers 41 inwardly of the head after the head has been depressed sufficiently to engage the follower rolls with the end rails. This much of the forming head is not new but is described in some detail in order to point out its coaction with the novel structure for erecting the double side walls.

The top plate 35 carries longitudinal extending pivots 44 along its sides and the pivots support depending side folding arms 45. The arms 45 on each side are connected by a cross piece 46 and springs 47 bearing between the cross pieces and the side arms 38 bias the arms 45 outwardly. The lower ends of the side folding arms 45 carry shoes 48 that are of downwardly and inwardly opening angle shape. One of the arms on each side of the head carries a follower roll 49 that is engageable with and travels along a cam rail 50 as the head is depressed.

Adjustable stops 51 on the upper ends of the arms 45 limit the outward swinging motion of the arms by engagement with the top plate 35.

The functioning of the machine is best illustrated in Figs. 3, 5, 6 and 7 and it will be seen therein that the initial downward movement of the box like face of the head depresses the blank 10 between the end rails 28. The end flaps 15 are immediately folded upwardly to almost right angles with respect to the bottom panel 14 of the blank and the locking ears 41 that project through the ends of the box portion 37 deflect the locking flaps 22 outwardly from the end flaps 15. Simultaneously the corner flaps 23 on the side wall flaps 16 of the blank are bent upwardly. Further downward motion of the head and blank brings the outer edges of the double side walls into engagement with the curved side rails 30 and the double side walls are deflected partially upwardly in the parallelogram shape indicated by the dotted lines at 52 in Fig. 3. At this position of the downward motion of the head and blank the follower rolls 49 on the side folding arms will have been moved inwardly by the cam rails 50 so that the angle shaped shoes 48 assume the position shown in Fig. 5 in contacting relation to the partially deflected side walls of the blank.

Continued downward motion of the head 7 causes the side folding arms 45 and shoes 48 to fold the double side walls inwardly and upwardly into rectangular cross section as is illustrated in Fig. 6. It is pointed out that the upper flanges of the shoes 48 engage the top panel portion 17 of the double side wall and assist the inner box portion 37 in pressing the blank downwardly between the end rails 28 which necessarily create some friction on the ends of the blank particularly when the machine is operating rapidly. Upward and inward folding of the side walls of the carton carries the corner flaps 23 inwardly into lapped relation alongside of the erected end walls of the carton. The locking fingers 41 being still extended through the locking flaps 22 the corner flaps are guided along the inside of the fingers 41 until the locking ears 24 on the corner flaps are positioned behind the fingers 41. At this position in the descent of the forming head the follower rollers 43 engage the upper ends of the end rails 28 and the arms 40 and fingers 41 are forced inwardly of the forming head to draw the locking

ears 24 inwardly through the openings formed by the locking flaps 22. The locking ears 24 snap free of the angle fingers 41 and lock over the edge of the slit 21 to positively lock the corner flaps to the end walls and hold the carton in erected position. The function of the angled folding shoes 48 in holding the double side walls in rectangular or slightly overfolded position is important to the erection of the cartons in that it assures that the corner flaps 23 and their locking noses 24 will be pressed and held in the proper position to be operated upon by the locking fingers 41. If the finished carton is not desired to be of true rectangular shape and the side walls are desired to have a bevel or angle, the movement of the shoes 48 can be adjusted accordingly. Since the box portion 37 of the blank advancing head cannot extend beyond the inner panel 18 of the double side wall, the angled shaped shoes 48 are necessary to prevent upward bowing of the sides of the blank and irregular and uncontrolled deflection of the corner flaps 28.

The erected blank, as illustrated in Fig. 8, may include extensions 53 that can later be folded into double end walls but this operation is optional and forms no part of the present invention.

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

1. A machine for erecting tray like cartons with double side walls from blanks having two opposite side portions folded double with the inturned flaps secured along their inner edges to the bottom portion of the blank and scored to form collapsed parallelograms, said machine comprising, a platform having a hole therein, means for delivering said blanks one at a time to said platform in upwardly facing position over said hole, a reciprocable head having a rectangular face adapted to press the bottom portion of each blank through said hole, chute forming rails depending below said plate and positioned to engage and fold the opposite end portions of said blanks and corner flaps on the ends of said side portions upwardly as the blank is advanced between the rails, other chute forming rails depending below said plate and converging inwardly of the chute below the plate to engage said doubled side portions and fold the same upwardly. arms pivoted on said head above and to the sides of said face, said arms having downwardly and inwardly opening angle elements on their swinging ends disposed above said face, means biasing said arms and angle elements outwardly from said head, cam rails extending along the sides of said chute above and below said plate and having downwardly and inwardly converging inner edges, cam followers carried by said arms and engageable with said cam rails to press the sides of said angle elements inwardly in folding contact with said side portions, said cam rails continuing downwardly and inwardly of said chute to cause said arms to erect said side portions into double walls and bring the inwardly extending flanges of said angle elements into overlapping relation to the top panel of the double walls, spring biased stripper fingers on the lower ends of said other chute forming rails, other arms pivoted on said head and having hooked fingers on their swinging ends, means directing said other arms and fingers in outwardly swinging motion to deflect lock flaps in the ends of said blank outwardly as said side portions and corner flaps are folded upwardly and inwardly whereby the fingers engage locking ears on said corner flaps and thereafter pull said ears inwardly through the end walls of the carton, and means for reciprocating said head in timed relation to said blank feeding means.

2. A machine for erecting tray like cartons with double side walls from blanks having two opposite side portions folded double with the inturned flaps secured along their inner edges to the bottom portion of the blank and scored to form collapsed parallelograms, said machine comprising, a platform having a hole therein, means for delivering said blanks one at a time to said platform

in upwardly facing position over said hole, a reciprocable head having a rectangular face adapted to press the bottom portion of each blank through said hole, chute forming rails depending below said plate and positioned to engage and fold the opposite end portions of said blanks and corner flaps on the ends of said side portions upwardly as the blank is advanced between the rails, other chute forming rails depending below said plate and converging inwardly of the chute below the plate to engage said doubled side portions and fold the same upwardly, arms pivoted on said head above and to the sides of said face, said arms having downwardly and inwardly opening angle elements on their swinging ends disposed above said face, means biasing said arms and angle elements outwardly from said head, cam rails extending along the sides of said chute above and below said plate and having downwardly and inwardly converging inner edges, cam followers carried by said arms and engageable with said cam rails to press the sides of said angle elements inwardly in folding contact with said side portions, said cam rails continuing downwardly and inwardly of said chute to cause said arms to erect said side portions into double walls and bring the inwardly extending flanges of said angle elements into overlapping relation to the top panel of the double walls, spring biased stripper fingers on the lower ends of said other chute forming rails, and means for reciprocating said head in timed relation to said blank feeding means.

3. A machine for erecting tray like cartons with double side walls from blanks having two opposite side portions folded double with the inturned flaps secured along their inner edges to the bottom portion of the blank and scored to form collapsed parallelograms, said machine comprising, a platform having a hole therein, means for delivering said blanks one at a time to said platform in upwardly facing position over said hole, a reciprocable head having a rectangular face adapted to press the bottom portion of each blank through said hole, chute forming means depending below said platform and positioned to engage and fold the opposite end portions of said blanks and corner flaps on the ends of said side portions upwardly as the blank is advanced between the rails, other chute forming means depending below said platform and coverging inwardly of the chute below the platform to engage said doubled side portions and fold the same upwardly, arms pivoted on said head, said arms having downwardly and inwardly opening angle elements on their swinging ends disposed above the sides of said face, means biasing said arms and angle elements outwardly from said head, cam rails extending along the sides of said chute and having downwardly and inwardly converging inner edges, cam followers on said arms engageable with said cam rails to press the sides of said angle elements inwardly in folding contact with said side portions, said cam rails continuing downwardly and inwardly of said chute to cause said arms to erect said side portions into double walls and bring the inwardly extending flanges of said angle elements into overlapping contacting relation to the top panels of the double walls, spring biased stripper means at the lower end of said chute engageable with the tops of said double walls, hooked fingers movably carried at the ends of said head, means directing said fingers outwardly to deflect lock flaps in the ends of said blank outwardly as said side portions and corner flaps are folded upwardly and inwardly whereby the fingers engage locking ears on said corner flaps and thereafter pull said ears inwardly through the end walls of the carton, and means for reciprocating said head in timed relation to said blank feeding means to advance blanks and cartons formed therefrom past said stripper means.

4. A machine for erecting tray like cartons with double side walls from blanks having two opposite side portions folded double with the inturned flaps secured along their inner edges to the bottom portion of the blank

and scored to form collapsed parallelograms, said machine comprising, a platform having a hole therein, means for delivering said blanks one at a time to said platform in upwardly facing position over said hole, a reciprocable head having a rectangular face adapted to press the bottom portion of each blank through said hole, chute forming means depending below said platform and positioned to engage and fold the opposite end portions of said blanks and corner flaps on the ends of said side portions upwardly at right angles as the blank is advanced between the rails, other chute forming means depending below said platform and converging inwardly of the chute below the platform to engage said doubled side portions and fold the same upwardly at less than right angles, arms pivoted on said head, said arms having downwardly and inwardly opening angle elements on their swinging ends disposed above the sides of said face, cam rails extending along the sides of said chute and having downwardly and inwardly converging inner edges, cam followers on said arms and engageable with said cam rails to press the sides of said angle elements inwardly in folding contact with said side portions, said cam rails continuing downwardly and inwardly of said chute to cause said arms to erect said side portions into double walls and bring the inwardly extending flanges of said angle elements into overlapping contacting relation to the top panels of the double walls, stripper means at the lower end of said chute engageable with the top of erected cartons, flap locking means carried by said head and operative to interlock said corner flaps with the end walls of the carton, and means for reciprocating said head in timed relation to said blank feeding means.

5. A machine for erecting tray like cartons with double side walls from blanks having two opposite side portions folded double with the inturned flaps secured along their inner edges to the bottom portion of the blank and scored to form collapsed parallelograms, said machine comprising, a platform having a hole therein, means for delivering said blanks one at a time to said platform in upwardly facing position over said hole, a reciprocable head having a rectangular face adapted to press the bottom portion of each blank through said hole, chute forming rails depending below said platform and positioned to engage and fold the opposite end portions of said blanks and corner flaps on the ends of said side portions upwardly at right angles as the blank is advanced between the rails, other chute forming rails depending below said platform and converging inwardly of the chute below the platform to engage said doubled side portions and fold the same upwardly, arms pivoted on said head, said arms having downwardly and inwardly opening angle elements on their swinging ends disposed above the sides of said face, means biasing said arms and angle elements outwardly from said head, cam rails extending along the sides of said chute above and below said plate and having downwardly and inwardly converging inner edges, cam followers carried by said arms and engageable with said cam rails to press the sides of said angle elements inwardly in folding contact with said side portions, said cam rails continuing downwardly and inwardly of said chute to cause said arms to erect said side portions into double walls and bring the inwardly extending flanges of said angle elements into overlapping contacting relation to the top panels of the double walls, spring biased stripper fingers at the lower end of said chute engageable with the tops of said double walls, and means for reciprocating said head in timed relation to said blank feeding means.

6. A machine for erecting tray like cartons with double side walls from blanks having two opposite side portions folded double with the inturned flaps secured along their inner edges to the bottom portion of the blank and scored to form collapsed parallelograms, said machine comprising, a platform having a hole therein, means for delivering said blanks one at a time to said platform in upwardly

facing position over said hole, a reciprocable head having a rectangular face adapted to press the bottom portion of each blank through said hole, chute forming rails depending below said platform and positioned to engage and fold the opposite end portions of said blanks and corner flaps on the ends of said side portions upwardly at right angles as the blank is advanced between the rails, other chute forming rails depending below said platform and converging inwardly of the chute below the platform to engage said doubled side portions and fold the same upwardly at less than right angles, arms pivoted on said head, said arms having downwardly and inwardly opening angle elements on their swinging ends disposed above the sides of said face, cam rails extending along said chute and having downwardly and inwardly converging inner edges, cam followers carried by said arms and engageable with said cam rails to press the sides of said angle elements inwardly in folding contact with said side portions, said cam rails continuing downwardly and inwardly of said chute to cause said arms to erect said side portions into double walls and bring the inwardly extending flanges of said angle elements into overlapping contacting relation to the top panels of the double walls, and means for reciprocating said head in timed relation to said blank feeding means.

7. A carton erecting machine adapted to erect carton blanks having integral end wall forming flaps and doubled side wall forming flaps comprising, means forming a chute, the end walls of the chute being spaced equally to the length of the carton to be erected and functioning to fold the end flaps to the blank upwardly at right angles to the center of the blank, the side walls of the chute being spaced apart further than the width of the carton to be erected and acting to engage and partially erect the doubled side wall flaps on the blank, means comprising a reciprocating head adapted to advance blanks through said chute, downwardly and inwardly facing angle shaped elements carried by said head and movable transversely thereof in the area of the partially deflected side wall forming flaps, cam means extending longitudinally of said chute and coacting with said angle shaped elements upon advancing motion of said head to move said elements inwardly into upwardly folding engagement with said side flaps, the downwardly facing portions of said angle shaped elements being positioned in the plane of the tops of the side walls when the side walls are erected, and means carried by said head and operative to interlock adjacent portions of the ends of said end flaps and side flaps after the flaps have been erected.

8. A carton erecting machine adapted to erect carton blanks having integral end wall forming flaps and doubled side wall forming flaps comprising, means forming a chute, the end walls of the chute being spaced equally to the length of the carton to be erected and functioning to fold the end flaps of the blank upwardly at right angles to the center of the blank, the side walls of the chute being fixed and spaced apart further than the width of the carton to be erected and acting to engage and partially erect the doubled side wall flaps on the blank, means comprising a reciprocating head adapted to advance blanks through said chute, downwardly and inwardly facing angle shaped elements carried by said head and movable transversely thereof in the area of the partially deflected side wall forming flaps, and fixed cam means coacting with said angle shaped elements upon advancing motion of said head to move said elements inwardly into upwardly folding engagement with the outer sides of said side flaps, the downwardly facing portions of said angle shaped elements being positioned in the plane of the tops of the side walls when the side walls are erected and when the bottom of the carton is engaged by said head.

9. A carton erecting machine adapted to erect carton blanks having end wall forming flaps and doubled side wall forming flaps comprising, means forming a chute, the end walls of the chute being spaced equally to the length of the carton to be erected and functioning to fold the end flaps of the blank upwardly at right angles to the center of the blank, the side walls of the chute being fixed and spaced apart further than the width of the carton to be erected and acting to engage and partially erect the doubled side wall flaps on the blank, means comprising a reciprocating head adapted to advance blanks through said chute, downwardly and inwardly facing angle shaped elements carried by said head and movable transversely thereof in the area of the partially deflected side wall forming flaps, and fixed means coacting with said angle shaped elements upon advancing motion of said head to move said elements inwardly into upwardly folding engagement with the outer sides of said side flaps, the downwardly facing portions of said angle shaped elements being positioned in the plane of the tops of the side walls when the side walls are erected.

10. In a machine for erecting a double wall on the side of a carton blank having a side wall forming flap folded inwardly with its inner edge secured to the bottom of the blank and scored to form a collapsed parallelogram, a reciprocable head engageable with the central portion of said blank to advance the same, an initial folding rail extending in fixed inwardly converging fashion alongside the path of movement of the blank and positioned to engage and partially deflect said flap from the plane of the center of the blank, an inwardly facing folding element carried by said head and movable transversely thereof across the partially folded position of said flap, means actuated in response to advancing motion of said head to move said element inwardly in a folding movement against the outer side of said flap, and a pressing surface extending at right angles inwardly from the folding surface of said element and positioned to engage the top surface of said flap when said flap is erected.

11. In a machine for erecting a double wall on the side of a carton blank having a side wall forming flap folded inwardly with its inner edge secured to the bottom of the blank and scored to form a collapsed parallelogram, a reciprocable head engageable with the central portion of said blank to advance the same, an initial folding projection extending inwardly of the path of movement of the flap to deflect said flap from the plane of the center of the blank, an inwardly facing folding element carried by said head and movable transversely thereof across the partially folded position of said flap, means actuated in response to advancing motion of said head to move said element inwardly in a folding movement against the outer side of said flap, and a pressing surface extending at right angles inwardly from the folding surface of said element and positioned to engage the top surface of said flap when said flap is erected.

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