This invention relates to folding box machinery and more particularly to an improved machine for manufacturing corrugated fiber containers having a simple glued flap.

Paper cartons or folding boxes of corrugated paperboard have heretofore been made in a wide variety. One common type of box comprises a contiguous piece of paperboard which is folded at each corner and joined on one corner by means of a sealing strip of tape the full depth of the box; such a box is called a "corner taped box." Another common form of paperboard box uses an overlapping joint ordinarily at one of the corners, and a plurality of heavy staples to join the overlapped ends; such a box is called a "stitched flap box." Many disadvantages and complications in the continuous manufacture of the above boxes have been encountered. With regard to the taped box, the finished box comprises two separate pieces, namely the box blank and the corner tape. In producing such a box, it is necessary to feed the tape to the folded box blank at the proper station. Tapebreakages and problems of registry have been frequent. Likewise, with the stitched box, the stapling machines must be properly timed and controlled. Furthermore, the staplers frequently jam or otherwise get out of order. In both cases, the set-up time for the machine is substantial due to the necessity of properly timing and adjusting the closure accessories.

The present box machine avoids the above disadvantages by using a simple glued flap and it is therefore possible to dispense with the corner tape as well as the complicated and expensive stapling machines used in the manufacture of the stitched flap box. The recent approval of a glued flap box for shipping, will permit this type of box to be produced in large quantities with consequent substantial reduction in cost.

A primary object of my invention therefore is to provide a folding box machine for glued flap paperboard boxes.

A further object of the invention is to provide in a folding box machine means for crushing a portion of the box blank to permit the folded blanks to be flat-stacked.

A further object of the invention is to provide an improved means for squaring a folded glued flap box blank.

A further object of the invention is to provide in a folding box machine for a glued flap box means for softening at least one of the folded corners of the blank to permit accurate squaring of the completely folded box.

Further objects will be apparent from the specification and drawings in which:

Fig. 1 is a top view partly diagrammatic of a folding box machine constructed in accordance with the present invention;

Fig. 2 is an enlarged sectional detail as seen at 2—2 of Fig. 1;

Fig. 3 is an enlarged fragmentary top view of a part of the structure of Fig. 1 showing the squaring and conditioning rolls;

Fig. 4 is an enlarged fragmentary detail as seen at 4—4 of Fig. 3;

Fig. 5 is an enlarged sectional detail of one of the crushing rolls, as seen at 5—5 of Fig. 1;

Fig. 6 is a top view of the structure of Fig. 5, but showing the crushing roll in broken lines;

Fig. 7 is an enlarged sectional detail as seen at 7—7 of Fig. 1;

Fig. 8 is a fragmentary detail of a part of the structure of Fig. 7 in a moved position;

Fig. 9 is a sectional view as seen at 9—9 of Fig. 7;

Figs. 10—17 show progressive steps in the scoring, slotting, folding and gluing operations of the structure of Fig. 1; and

Fig. 18 is a fragmentary sectional detail as seen at 18—18 of Fig. 1.

The invention comprises essentially a modified and improved box folding machine in which a scored and slotted box blank is cut to provide a flap at one corner thereof. The flap as well as a portion of the abutting end to which the flap is glued is pressed or crushed to substantially reduce half its original thickness. After glue is applied to the flap, the ends of the blank are folded over so that the crushed flap is in contact with the crushed portion on the opposite end of the blank.

The box folding mechanism comprises a pair of rotating cranks having rollers on the ends thereof, which are staggered transversely of the box blank conveyor. With the glue still in a tacky condition, the edges of the folded blank are squared and crushed by a pair of oppositely disposed, driven rolls of special shape. The conditioned blanks are then fed to a squaring abutment or backstop located directly across the main conveyor line so that the folded boxes are continuously best up against the backstop and at the same time carried and pressed transversely to a stacking station. By the time the boxes have reached the stacking station, the glue has set so that the box blanks are exactly squared and can be stacked without bulging at the flap joint.

Referring now more particularly to Fig. 1, a box folding machine constructed in accordance with the invention comprises fixed longitudinal frame members 23 and 24 which are parallel to and enclose the adjustable conveyor frame mem-
bers 25 and 26. Fixed members 23 and 24 extend from the loading platform 27 at one end to the squaring platform 28 at the other end. The box blanks are placed on platform 27 between guides 30 and 32 and from them are fed under a shaft 31 journalized in frames 23 and 24. Shaft 31 is provided with a flap-forming knife roll 32, longitudinal slotting rolls 33, 34, and 35, and a segmental crushing roll 36 at the opposite end. After passing through sheefer under shaft 37 which is provided with four longitudinal score rolls 38, 39, 40, and 41. It will be understood that cooperating shafts and rolls are provided underneath shafts 31 and 37 and that the scoring and scoring of box blanks is well known in the art. The transverse score lines 45 and 46 (as seen in Fig. 11) are applied to the box blank in conventional manner. It will also be understood that roll 33 cuts slots 47 and 48, roll 34 cuts slots 49 and 50, and roll 35 cuts slots 51 and 52; whereas rolls 36-41 make score lines 53, 54, 55, and 56 respectively.

After passing under shaft 37, the scored and slotted blank appears substantially as shown in Fig. 11, having a flap 57 at one end which has been cut off roll 32, and a crushed area 58 at the opposite end which has been made by roll 36, as shown more clearly in Fig. 5. This roll has a raised segment 59 having a length substantially equal to the length of flap 57 so that when the box blank 29 (which is usually of the well known corrugated cardboard construction) passes between roll 36 and backing roll 60, a portion of the blank between transverse score lines 45 and 46 is pressed or crushed to approximately one-half its original thickness.

Shaft 61 journalized in frame members 23 and 24, carries a crushing roll 62 for the flap 57 and also is provided with pulleys 63, 64 for belts 65 and 66. As control of the box blank 29 is transferred from the rolls on shafts 31 and 37 to belts 64 and 65, the flap 57 is compressed or crushed to approximately one-half its original thickness, as described above. Upon passing under control of belts 64 and 65, the flap 57 passes over the glue 66 which applies glue to the underside of the flap.

The main conveyer belts 67 and 68 also pass over pulleys 69, 70 on shaft 70 which is directly below shaft 61 (Fig. 10). Belts 67 and 68 extend longitudinally between the fixed members 23 and 24 and pass over pulleys 75 and 76 on shaft 77 (Fig. 12). The belts are likewise supported along their lengths on small rollers 78, 79 (shown in Fig. 2) and a plurality of box blank guide rollers 78, 79 are adjustable mounted in bracket assemblies 80 secured to frame members 25 and 26.

Fig. 13 illustrates the supporting framework for the upper conveyer belts 64 and 65 which comprises frame members 81 and 82 and transversely sidable on rods 83 and 84. Lateral adjustment for bracket 82 is obtained by rotation of screw shafts 85 and 86 which are journalized in stationary frame member 87. Crank 88 is connected to screw shaft 85, and shafts 85 and 86 are drivingly connected to screw shafts 89 and 90 by means of chain 91. In this way, rotation of crank 88 serves to laterally position adjustable frame member 86 simultaneously with bracket 82.

The opposite bracket 81 and opposite adjustable frame member 25 may be similarly adjusted by means of a crank 88a secured to the screw shaft 85a journalized in stationary frame member 87a. Shaft 85a is drivingly connected to corresponding screw shafts 89a, 92a and 90a. Frame members 25 and 26 are sidably supported on cross shafts 92 and 93 mounted in the stationary frame members 23 and 24.

As the box blanks pass beyond the crushing roll 62, as shown in Fig. 11 with the flap 57 and the cooperating area 68 compressed, as soon as the blanks have passed under the glue 66, the upper portion 29a of the blank comes in contact with the folding arm 96 which bends this portion of the box around score line 54, as shown in Fig. 11. The flap 57 is thereafter passed by arm 97, the opposite box portion 29b comes in contact with the opposite folding arm 99 which is longitudinally offset on the conveyer with respect to arm 98. Progression of the blank similarly bends portion 29b on score line 56, as shown in Fig. 13.

As the upper portion 29a leaves arm 98, it is engaged by a rotating cranking 100 which is mounted on a transverse shaft 101 by means of a ratchet drive 103 controlled by a spring 104. Shaft 102 is journalized in bracket 105 in frame member 25 and is driven by a sprocket 106 and a chain 107. The opposite folding cranking 100 is longitudinally offset on frame member 26 with respect to cranking 100. Otherwise, the construction of the folding cranks is identical. Each cranking arm proper is provided with a corresponding bracket member jour- nialized on a stud 110 fastened in the end of crank arms 100, 108 by means of a cap screw 111. Crank 108 is mounted on shaft 112 with which it also has a spring-loaded ratchet driving connection at 113. Spring 114 permits the crank 108 to be turned on shaft 112 so that it may be driven in any desired relationship with the travel of the box blanks on the conveyer. Crank 108 is driven by means of a sprocket 115 secured to shaft 112 and a chain 116.

Fig. 13 shows the upper portion of the box blank 29b folded completely flat by crank 100 and at the same time the opposite portion 29b has been partially folded by means of the arm 99. As the blank further advances along the conveyer, crank 108 folds down the portion 29b so that the crushed area 58 on portion 29b overlaps the flap 57 as shown in Fig. 14.

Due to the fact that the scoring rolls 39 and 41 may register either between corrugations on the box blank or on top of a corrugation or in any intermediate location, it sometimes happens that the score lines do not provide a completely squared blank upon frame member 25 and 26 having performed their function. Such a blank is shown in Fig. 16 in which it will be noticed that the edges of portions 29a and 29b are not in line. In order to insure that the box blanks when finally glued are completely square, I provide a pair of conditioning and squaring rollers 120, 121 transversely opposite each other on frames 25 and 26 respectively. The periphery of each roll 120 and 121 has a V-shaped portion 122 which terminates in an annular narrow groove 123 of substantially less width than twice the thickness of the box blank. The rolls are mounted on adjustable bracket assemblies 125 and 126, and the roll shafts 127 and 128 are provided with driven pulleys 129 and 130 respectively, that are in turn driven from shaft 78 through belts 131, 132 and pulleys 133, 134 on shaft 77.

As the folded blanks proceed along the conveyer belt, the slotted edges 29c and 29d are engaged by the rolls 120 and 121. Some crushing effect takes place on these slotted edges 29c, 29d, but the material that has previously been removed by the slotting operation somewhat reduces the lateral pressure between the rolls, and consequently the amount of crushing or soften-
ing. However, when the rolls 120 and 121 contact the folded areas 29e and 29f of the edges (Figs. 15 and 16), these edges are laterally forced into grooved areas 133 and 134, and the work blank is extruded and softened. As the edges 29e and 29f come in contact with the rolls 120, 121, any mis-alignment in portions 29a and 29b is corrected by the lateral pressure between the rolls which twists the portions into place by pressing around the previously softened edges 29e and 29f.

It will thus be understood that the rolls 120 and 121 perform dual functions. First, they crush or condition the folded edges of the blanks and second, the rolls assist in aligning and squaring both the longitudinal and side edges of the folded blanks. As a result, a mis-aligned blank such as shown in Fig. 16, is usually properly aligned after it leaves the rolls 120 and 121.

After the box blanks have been carried beyond conditioning rolls 120 and 121, they leave conveyor belt 67 and 68 and pass between a plurality of lower driven shafts 135, 136, 137 and 138, and cooperating upper shafts 136c, 137c, 137a and 138a. The upper shafts may, if desired, be provided with individual rolls 138, 139 positioned to engage the edges of the box blank. Overriding, or conventional positioning of the mechanism (not shown) will be located either at the front of the frame for example, between shafts 37, 61, or at the rear of the frame between shafts 136a—138a. As the blanks pass over the last shaft 136, they are kicked onto a transversely moving conveyor belt 140, 123 so that the folded portion of the box blank 141 by means of eccentric kicker rollers 163, 142 on shaft 143. The rate of travel of conveyor belt 140 is relatively slower than belts 67 and 68 so that the folded blanks are stacked in an overlapping or shingled relationship, as shown in Fig. 9. With the blanks thus stacked and with the glue on flap 51 still tacky, it is possible to align the portions 29a and 29b with great accuracy.

This final aligning operation adequately removes any mis-alignment in the edges of the box blanks that has not previously been corrected by rolls 121, 121. For this purpose, I employ a reciprocating blade 150 which is pivotally mounted on shaft 151 by means of angle brackets 152 and 153. The blade 150 is caused to reciprocate transversely of belt 140 by means of an eccentric 154 on shaft 155. Eccentric 154 is connected to blade 150 by eccentric strap 156 which is pivotally secured to a backing plate 157 on the blade. The top edge of the blade is notched or serrated so that fingers 158a, 158b which form the serrations on the blade, are in alignment with the gaps between rolls 130a, 130a on shaft 130 when the blade 150 is retracted in the position of Fig. 8. In this position of the blade, a blank is kicked from the shafts 130, 130 onto the belt 140 and against the backstop 141 (Fig. 9). As the blank is moved to the backstop, the edges of the box blank are precisely aligned by pressure between the backstop 141 and the blade 150. Furthermore, the shingled stacking of the boxes insures that each blank is beaten up against the backstop many times before the BOX BLANK ON A BOX BLANKING MACHINE is thrown off. The backstop 141 is mounted on a pair of adjusting screws 158, 159 mounted in rotatable threaded guides 159, 159. Accurate adjustment of the backstop may be made by means of the hand wheel 150 and chain 161 by which guides 158, 159 are simultaneously turned.

The proper pressure for completing the adhesion between the glued flap 51 and the cooperating edge of the folded blank, is obtained by means of a floating pressure belt 142 mounted on idle rollers 163 and 164. This belt is pivotally supported from shaft 165 by means of arms 166 and 167. Shaft 163 is journaled in arms 166 and 167, drives roller 164 through chains 170 and 171. It will be noted that members 172 and 173 are of sufficient length to locate the roller 164 on blade 130 so that the shingled blanks are pressed by the belt 162 before they pass beyond contact with blade 150. This insures the final application of gluing pressure while accurate alignment is still maintained.

It will thus be understood that I have provided a relatively simple, accurate and efficient box folding machine which insures extremely accurate gluing of an overlapped flap. This is important in providing accurate stacking and shipment of the knocked-down blanks as well as proper registry of the flaps when the box is opened. Furthermore, the crushing of the overlapped area of the blank assists in stacking the blanks and in avoiding any projection on the outside of the completed stack.

Having thus described my invention, I claim:
1. In box forming machinery, a combination which comprises a flap-cutting roll, a crusher for said flap, a crusher for the box blank in an area positioned to register with the flap when the blank is folded, a first box blank folding arm rotatably mounted adjacent the folded edge of the box blank, a second box blank folding arm rotatably mounted in staggered relation to the opposite edge of the folded box blank, means for timing said box folding arms with respect to the conveyor belt, a concave crushing roll mounted on either side of the edge of the advancing box blank, a backstop against which the folded box blanks are delivered after passing through the conditioning rolls, aligning means for beating up the folded box blanks against the backstop, and a second conveyor for carrying the folded box blanks transversely away from the backstop.

2. In box forming machinery, the combination which comprises a flap-cutting roll, a crusher for said flap, a crusher for the box blank in an area positioned to register with the flap when the blank is folded, a first box blank folding arm rotatably mounted adjacent the folded edge of the box blank, a second box blank folding arm rotatably mounted in staggered relation to the opposite edge of the folded box blank, means for timing said box folding arms with respect to the conveyor belt, a concave crushing roll mounted on either side of the edge of the advancing box blank, a backstop against which the folded box blanks are delivered after passing through the conditioning rolls, aligning means for beating up the folded box blanks against the backstop, and a second conveyor for carrying the folded box blanks transversely away from the backstop.

3. In box forming machinery, the combination which comprises a flap-cutting roll, a crusher for said flap, a crusher for the box blank in an area positioned to register with the flap when the blank is folded, a first box blank folding arm rotatably mounted adjacent the folded edge of the box blank, a second box blank folding arm rotatably mounted in staggered relation to the opposite edge of the folded box blank, means for timing said box folding arms with respect to the conveyor belt, a concave crushing roll mounted on either side of the edge of the advancing box blank, a backstop against which the folded box blanks are delivered after passing through the conditioning rolls, aligning means for beating up the folded box blanks against the backstop, and a second conveyor for carrying the folded box blanks transversely away from the backstop.

4. In box forming machinery, the combination which comprises a flap-cutting roll, a crusher for said flap, a crusher for the box blank in an area positioned to register with the flap when the blank is folded, a first box blank folding arm rotatably mounted adjacent the folded edge of the box blank, a second box blank folding arm rotatably mounted in staggered relation to the opposite edge of the folded box blank, means for timing said box folding arms with respect to the conveyor belt, a concave crushing roll mounted on either side of the edge of the advancing box blank, a backstop against which the folded box blanks are delivered after passing through the conditioning rolls, aligning means for beating up the folded box blanks against the backstop, and a second conveyor for carrying the folded box blanks transversely away from the backstop.

5. In box forming machinery, the combination which comprises a flap-cutting roll, a crusher for said flap, a crusher for the box blank in an area positioned to register with the flap when the blank is folded, a first box blank folding arm rotatably mounted
adjacent the folded edge of the box blank, a second box folding arm rotatably mounted in staggered relation to the opposite edge of the folded box blank, means for driving said folding arms with respect to the conveyor belt, a concave crushing roll mounted on either side of the edge of the advancing box blank, a backstop against which the folded box blanks are delivered after passing through the conditioning rolls, means for beating up the folded box blanks against the backstop, and a second conveyor for carrying the folded box blanks transversely away from the backstop.

4. The sub-combination in a box folding machine which comprises a pair of longitudinal parallel frame members, a conveyor belt mounted on each of said frame members, a plurality of roll shafts mounted in advance of said frame members, a plurality of cutting rolls on said roll shafts, at least one of said cutting rolls forming a flap on a box blank, a crushing roll positioned on one of said shafts for compressing said flap to substantially one-half its initial thickness, a second crushing roll mounted on one of said shafts for compressing a flap-cooperating area on the opposite end of the box blank to substantially one-half its initial thickness, a first rigid folding arm mounted on one of said frame members, a second rigid folding arm in lateral staggered relation to said first folding arm, said second arm being mounted on the other of said frame members, a first driven crank rotatable in a vertical plane and mounted on one of said frame members adjacent the terminus of the first folding arm, a second driven crank rotatable in a vertical plane mounted in the other of said frame members adjacent the terminus of the second folding arm, means for rotating each of said cranks in timed relation to the conveyor belt travel, a pair of conditioning rolls mounted transversely opposite each other on the adjustable frame members and at a station subsequent to said cranks, a vertical shaft for each of said shafts, walls around the periphery of each of said conditioning rolls defining a V-shaped annular notch, walls on each of said rolls defining an annular groove at the base of said notches, a transverse conveyor positioned at a station subsequent to the conditioning rolls, a backstop positioned over said transverse conveyor and in alignment with the frame members, kicker means for depositing folded box blanks against the backstop and onto the transverse conveyor, and a reciprocating blade for beating up the folded box blanks against the backstop.

5. The sub-combination in a box folding machine which comprises a pair of longitudinal parallel frame members, a conveyor belt mounted on each of said frame members, a plurality of roll shafts mounted in advance of said frame members, a plurality of cutting rolls on said roll shafts, at least one of said cutting rolls forming a flap on a box blank, a crushing roll positioned on one of said shafts for compressing said flap to substantially one-half its initial thickness, a second crushing roll mounted on one of said shafts for compressing a flap-cooperating area on the opposite end of the box blank to substantially one-half its initial thickness, a first rigid folding arm mounted on one of said frame members, a second rigid folding arm in lateral staggered relation to said first folding arm, said second arm being mounted on the other of said frame members, a first driven crank rotatable in a vertical plane and mounted on one of said frame members adjacent the terminus of the first folding arm, a second driven crank rotatable in a vertical plane mounted in the other of said frame members adjacent the terminus of the second folding arm, means for rotating each of said cranks in timed relation to the conveyor belt travel, a pair of conditioning rolls mounted transversely opposite each other on the adjustable frame members and at a station subsequent to said cranks, a vertical shaft for each of said shafts, walls around the periphery of each of said conditioning rolls defining a V-shaped annular notch, walls on each of said rolls defining an annular groove at the base of said notches, a transverse conveyor positioned at a station subsequent to the conditioning rolls, a backstop positioned over said transverse conveyor and in alignment with the frame members, kicker means for depositing folded box blanks against the backstop and onto the transverse conveyor, and a reciprocating blade for beating up the folded box blanks against the backstop.

6. The sub-combination in a box folding machine which comprises a pair of longitudinal parallel frame members, a conveyor belt mounted on each of said frame members, means for feeding box blanks to said conveyor belt, means for crushing transverse marginal areas on each of said blanks, means positioned on each of said frame members for folding the ends of the box blanks to present crushed areas in overlapping relationship, a pair of conditioning rolls mounted transversely opposite each other on the frame members, walls around the periphery of each of said conditioning rolls defining a V-shaped annular notch, and walls on each of said rolls defining an annular groove at the base of said notches, means for depositing folded box blanks against the backstop and onto the transverse conveyor, and a reciprocating blade for beating up the folded box blanks against the backstop.

7. The sub-combination in a box folding machine which comprises a pair of longitudinal parallel frame members, a conveyor belt mounted on each of said frame members, means for feeding box blanks to said conveyor belt, a transverse conveyor positioned at a station subsequent to said conditioning rolls, a backstop positioned over said transverse conveyor and in alignment with the frame members, kicker means for depositing folded box blanks against the backstop and onto the transverse conveyor, and a reciprocating blade for beating up the folded box blanks against the backstop.

8. The sub-combination in a box folding machine which comprises a pair of longitudinal parallel frame members, a conveyor belt mounted on each of said frame members, means for feeding box blanks to said conveyor belt, a transverse conveyor positioned at a station subsequent to said conditioning rolls, a backstop positioned over said transverse conveyor and in alignment with the frame members, kicker means for depositing folded box blanks against the backstop and onto the transverse conveyor, and a reciprocating blade for beating up the folded box blanks against the backstop.
frame members for folding the ends of the box blanks to present said crushed areas in overlapping relationship, a pair of conditioning rolls mounted transversely opposite each other on the adjustable frame members and at a station subsequent to said cranks, a vertical shaft for each of said conditioning rolls, means for driving each of said shafts, walls around the periphery of each of said conditioning rolls defining a V-shaped annular notch, walls on each of said rolls defining an annular groove at the base of said notch, of substantially less width than twice the thickness of a box blank, a transverse conveyer positioned at a station subsequent to the conditioning rolls, a backstop positioned over said transverse conveyer and in alignment with the frame members, kicke means for depositing folded box blanks against the backstop and onto the transverse conveyer, and a reciprocating blade for beating up the folded box blanks against the backstop.

9. A box folding machine comprising a pair of parallel longitudinal stationary frame members, a pair of transversely adjustable frame members supported between said stationary frame members, means for simultaneously adjusting said second named frame members, a conveyor belt mounted on each of said adjustable frame members, a plurality of roll shafts journeled in said stationary frame members in advance of the adjustable frame members, at least one cutting roll on said shafts for forming a flap on the box blank, a punching roll positioned on one of said shafts for compressing a flap-cooperating area on the opposite end of the box blank to substantially one-half its initial thickness, a first rigid folding arm mounted on one of said adjustable frame members, a second rigid folding arm in lateral staggered relation to said first folding arm, said second arm being mounted on the other of said adjustable frame members, a plurality of roll shafts journeled in said stationary frame members in advance of the adjustable frame members, a plurality of cutting rolls on said roll shafts, means for rotating each of said rolls in timed relation to the conveyer belt travel, at least one conditioning roll mounted on one of the adjustable frame members and at a station subsequent to said cranks, a vertical shaft for said conditioning roll, means for driving said said shaft, walls around the periphery of said conditioning roll defining a V-shaped annular notch, and walls on said roll defining an annular groove at the base of said notch, of substantially less width than twice the thickness of a box blank.

10. A box folding machine comprising a pair of parallel longitudinal stationary frame members, a pair of transversely adjustable frame members supported between said stationary frame members, means for simultaneously adjusting said second named frame members, a conveying belt mounted on each of said adjustable frame members, a plurality of roll shafts journeled in said stationary frame members in advance of the adjustable frame members, a plurality of conditioning rolls on said roll shafts, means for driving said said said shaft, walls around the periphery of each of said conditioning rolls defining a V-shaped annular notch, walls on each of said rolls defining an annular groove at the base of said notch, of substantially less width than twice the thickness of a box blank, a transverse conveyer positioned at a station subsequent to the conditioning rolls, a backstop positioned over said transverse conveyer and in alignment with the adjustable frame members, kicke means for depositing folded box blanks against the backstop and onto the transverse conveyer, and a reciprocating blade journeled on the stationary frame members for beating up the folded box blanks against the backstop.

11. A box folding machine comprising a pair of parallel longitudinal stationary frame members, a pair of transversely adjustable frame members supported between said stationary frame members, means for simultaneously adjusting said second named frame members, a conveying belt mounted on each of said adjustable frame members, a plurality of roll shafts journeled in said stationary frame members in advance of the adjustable frame members, a plurality of cutting rolls on said roll shafts, means for rotating each of said rolls in timed relation to the conveyer belt travel, at least one conditioning roll mounted on one of the adjustable frame members and at a station subsequent to said cranks, a vertical shaft for said conditioning roll, means for driving said said shaft, walls around the periphery of each of said conditioning rolls defining a V-shaped annular notch, walls on each of said rolls defining an annular groove at the base of said notch, of substantially less width than twice the thickness of a box blank.
bers, a pair of transversely adjustable frame members supported between said stationary frame members, means for simultaneously adjusting said second named frame members, a conveyor belt mounted on each of said adjustable frame members, a plurality of roll shafts journalized in said stationary frame members in advance of the adjustable frame members, a plurality of cutting rolls on said roll shafts, at least one of said cutting rolls forming a flap on a box blank, a crushing roll positioned on one of said shafts for compressing said flap to substantially one-half its initial thickness, a second crushing roll mounted on one of said shafts for compressing a flap-cooperating area on the opposite end of the box blank to substantially one-half its initial thickness, a gluer mounted on one of the stationary frame members for applying glue to one side of the flap, a first rigid folding arm mounted on one of the adjustable frame members, a second rigid folding arm in lateral staggered relation to said first folding arm, said second arm being mounted on the other of said adjustable frame members, a first driven crank rotatable in a vertical plane and mounted adjacent the terminus of the first folding arm, a second driven crank rotatable in a vertical plane mounted adjacent the terminus of the second folding arm, means for rotating each of said cranks in timed relation to the conveyor belt travel, a transverse conveyor positioned at a station contiguous to the terminus of the conveyor belts, a backstop positioned over said transverse conveyor and in alignment with the adjustable frame members, kicker means for depositing folded box blanks against the backstop and onto the transverse conveyor, and a reciprocating blade journalized on the stationary frame members for effecting the folded box blanks against the backstop.

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