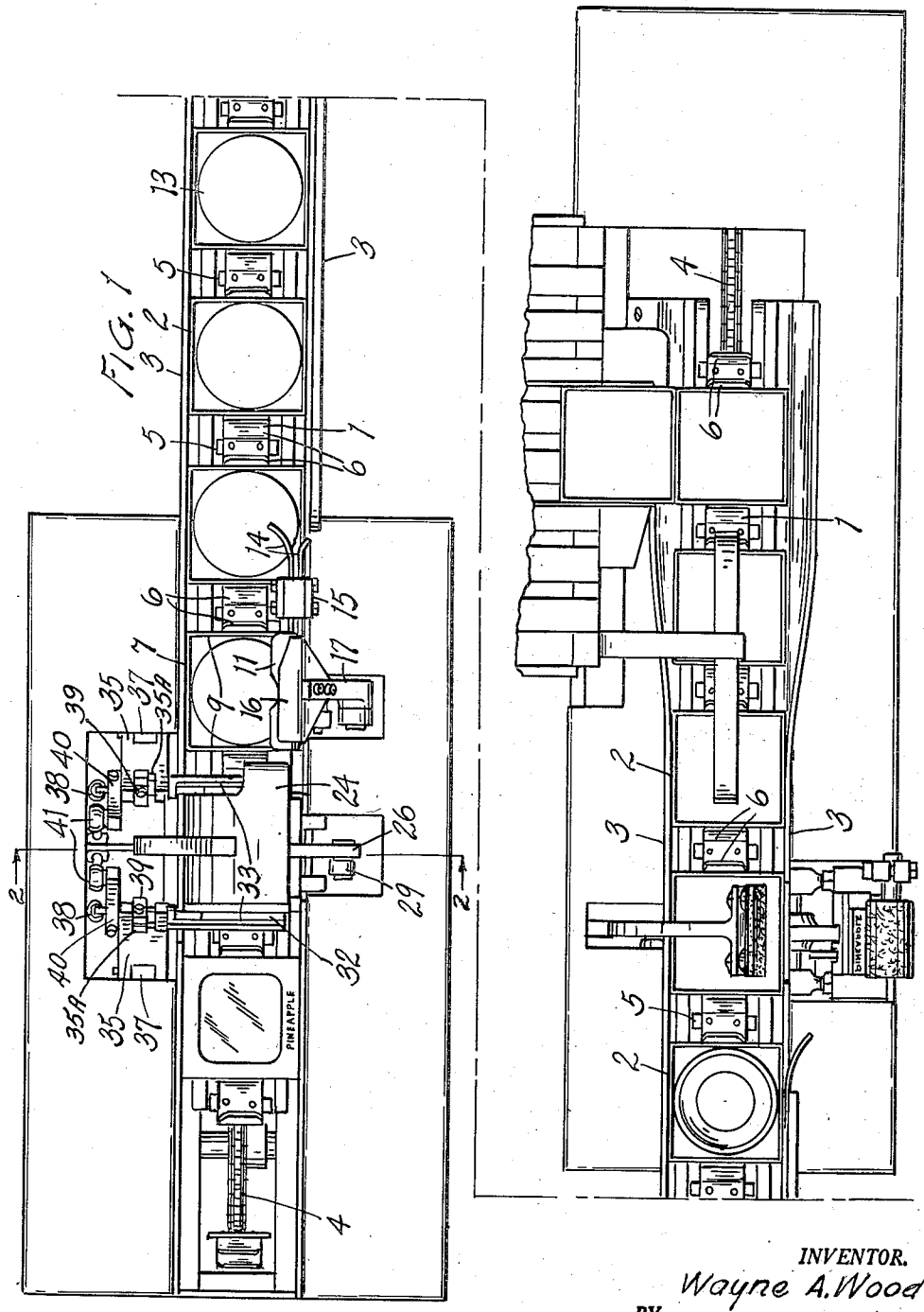
Jan. 12, 1954 W. A. WOOD 2,665,532

CARTON CLOSING MACHINE

Filed Sept. 14, 1950 3 Sheets-Sheet 1

FIG. 1




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CARTON CLOSING MACHINE

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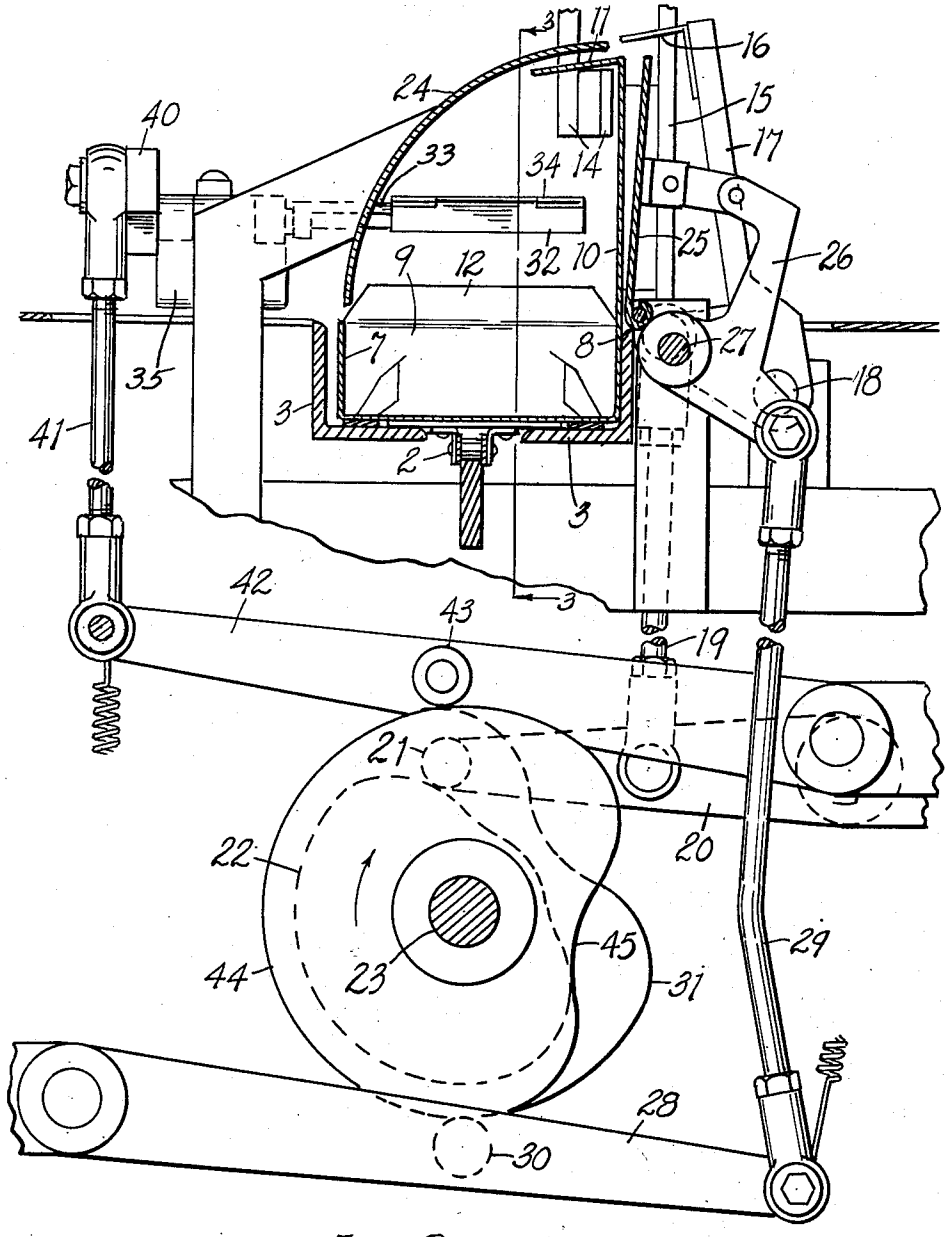



FIG. 2

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CARTON CLOSING MACHINE

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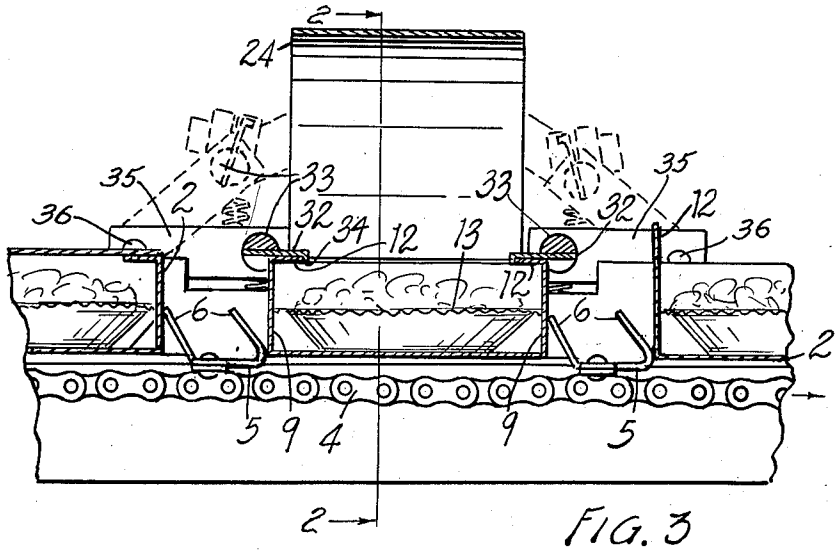



FIG. 3

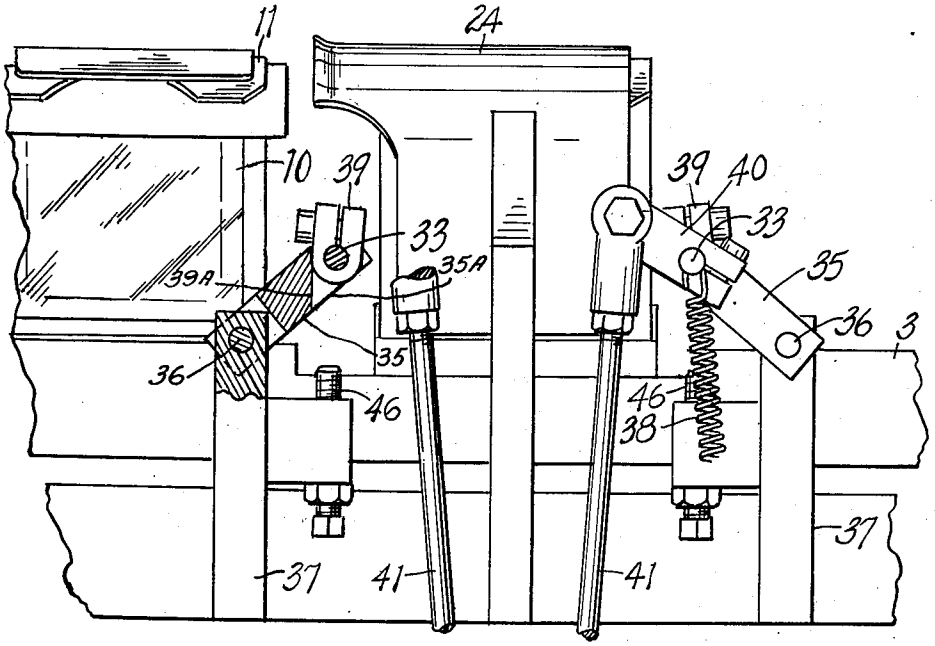



FIG. 4

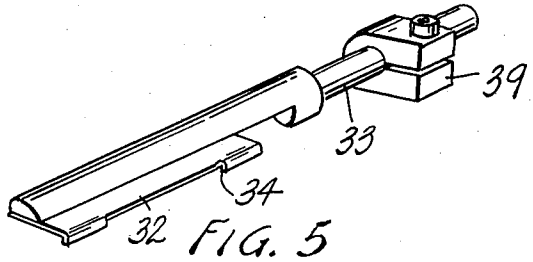



FIG. 5

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2,665,532

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2,665,532

## CARTON CLOSING MACHINE

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Application September 14, 1950, Serial No. 184,769

7 Claims. (Cl. 53—147)

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This invention relates to improvements in a carton closing machine.

The principal objects of this invention are:

First, to provide an improved form of machine for folding or closing the cover and top end flaps of a carton after the carton has been partially erected and placed on an intermittently advancing conveyor and filled with the desired contents.

Second, to provide a carton closing machine of the type described with flap folding blades that are swingable between an inoperative position to clear cartons translated thereby and an operative position to neatly and sharply fold the end flaps of a carton positioned at a folding station underneath the blades.

Third, to provide flap folding blades for a carton closing machine with a composite swinging and rotating motion that first presses the flaps generally inwardly and then completes the folding operation with a bending movement about an axis parallel to the fold line of the flap.

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

The drawings, of which there are three sheets, illustrate a preferred form of my carton closing mechanism.

Fig. 1 is a plan view of my carton closing machine operatively associated with a conveyor for intermittently advancing the cartons.

Fig. 2 is a fragmentary transverse cross sectional view through the closing mechanism along the plane of the line 2—2 in Figs. 1 and 3.

Fig. 3 is a fragmentary longitudinal cross sectional view through the conveyor and closing mechanism taken along the plane of the line 3—3 in Fig. 2.

Fig. 4 is a fragmentary front elevational view of the conveyor and carton closing mechanism with portions of the elements broken away and shown in section.

Fig. 5 is a perspective view of one of the flap closing blades.

The flap closing mechanism which forms this invention constitutes an improved form of a similar mechanism disclosed and claimed in the copending application of Richard C. Stenger, Serial No. 113,716, filed September 2, 1949, for Machine for Conveying and Closing Cartons.

My closing mechanism is designed to be applied to a carton conveying machine which includes an intermittently movable conveyor 1 mounted to translate a series of cartons 2 in a step by step fashion along the supporting side rails 3. The conveyor 2 includes the continuous chain 4 on

2

which are mounted a series of longitudinally spaced flights or cross bars 5. With particular reference to Fig. 3, it will be noted that the cross bars 5 are of substantial longitudinal width and are provided with front and rear upturned flanges 6 which are inclined rearwardly of the path of movement of the conveyor so that the front flange forms an inclined surface for urging the carton in the pocket ahead of the flange forwardly into properly centered position longitudinally of the cross bars.

The cartons 2 are of folded pasteboard construction and are provided with a front wall 7, rear wall 8 and end walls 9. A cover 10 is hingedly connected to the top of the rear wall 8 and the cartons are placed on the conveyor with the cover in upstanding unfolded position. The upper edge of the cover 10 may be provided with a tuck flap 11 which is also in unfolded condition when the cartons are placed on the conveyor. The upper edges of the end walls 9 are provided with flaps 12 which may be designated as end wall flaps. The end wall flaps 12 are also in upstanding unfolded position when the cartons are placed on the conveyor. This permits easy loading of contents into the container. My flap closing mechanism is designed to close or bend the top end flaps inwardly of the container after it has been loaded without interfering with the regular advance of the cartons or the closing of the covers 10.

After the cartons have been filled as by the pies indicated at 13, the conveyor 1 advances the cartons so that their upstanding covers enter between a pair of transversely spaced guide bars 14 supported above the side of the conveyor by an upright 15. After the cartons and covers have passed the upright 15, the tuck flap 11 of each carton is bent forwardly over an extension of the inner rail 14 as is best illustrated in Fig. 2. Folding of the tuck flap is accomplished by the folder flange 16 mounted on the end of an arm 17. The arm 17 is pivotally supported at 18 and is rotated forwardly by the action of a link 19 connecting the arm with a lever 20 pivoted on the base of the machine. The lever 20 is provided with a follower roll 21 which is controlled by a cam 22 mounted on the cam shaft 23.

After the tuck flap 11 has been folded forwardly the carton is advanced to a closing station positioned underneath the arcuate cover guide plate 24. A closing plate 25 pivoted to the rear side rail 3 at the closing station is swung forwardly to close the cover 10 by means of the bell crank 26. The crank 26 is pivotally supported at

27 and connected to a lever 28 by the push rod 29. The lever carries a follower 30 engageable with and controlled by a second cam 31 on the cam shaft 23.

The top end flaps 12 may be folded inwardly either prior to or after the closing of the cover 10. In the illustrated example of my machine, the flaps are folded prior to closing the cover so that the flaps are disposed inside of the finished carton. The actual folding of the flaps 12 is accomplished by a pair of folding blades 32 rotatably and swingably mounted above the conveyor by the transversely extending shafts or pins 33. The upper or inner edges of the blades 32 are provided with inturned and downturned fingers 34 which engage the outer swinging edges of the end flaps 12.

In order that the incoming cartons to the closing station and their upstanding end flaps may clear the transverse blades 32 and pins 33, these pins are swingably supported in the upper ends of the arms 35. The lower pivoted ends of the arms 35 are supported on the rock shafts 36 journalled in uprights 37 on the forward side of the conveyor. The forward ends of the shafts 33 project through the arms 35 and serve as anchors for coil springs 38 extending downwardly to a fixed part of the base (not illustrated) to constantly urge the arms and shafts 33 downwardly. An adjustable split clamp 39 on each shaft 33 serves to transversely locate the shaft and folding blade 32 with respect to the arms 35.

The upper or swinging ends of the arms 35 are notched or bifurcated as at 35(a) with the shafts 33 passing through the bifurcations. The clamps 39 are positioned between the arms of the bifurcations and the bottoms of the notches in the arms 35 are flattened as at 39(a) to form stops coacting with the flat sides of the clamps to limit rotation of the shafts 33 and blades 32 relative to the arms 35 and outwardly with respect to the flaps on the ends of the carton.

In order to prevent or control the descent of the arms 35 and blades 32, the forward end of each shaft 33 carries a crank arm 40 which is securely clamped to the shaft in longitudinally outwardly extending direction from the pivots 36. The swinging ends of the crank arms 40 are connected by the downwardly converging push rods 41 with the swinging ends of a lever 42. The lever 42 carries a follower 43 engageable with a third cam 44 mounted on the cam shaft 23. In the upwardly extended position of the push rods 41, the shafts 33 and blades 32 will be rotated upwardly and outwardly from the carton closing station until the cranks 40 are approximately aligned with the arms 35. In this position the push rods 41 resist the action of the springs 38 to lower the folding blades. Abutment of the clamps 39 against the stops 39(a) prevents downward collapse of the toggles formed by the arms 35 and 40. As the follower 43 falls into the relieved portion 45 of the cam 44 and as the push rods 41 are drawn downwardly, the springs 38 are first operative to rotate the arms 35 and swing blades 32 downwardly. At the lower limit of movement of the arms 35 as determined by the adjustable stop screws 46, continued downward movement of the push rods 41 will rotate the cranks 40 about the axes of shafts 33 inwardly of the carton to fold the top end flaps of the carton inwardly.

Thus the folding blades 32 are given a swinging motion longitudinally of the conveyor by the arms 35 and are given a final inward rotating motion by the cranks 40.



The surfaces of the cams 22, 31 and 44 are so angularly arranged with respect to each other that the end folding blades 32 will be lowered and rotated inwardly and then retracted prior to the closing of the cover 10 and prior to the advancing of a new carton into the closing station. The folding of the end flaps by means of blades pivoted closely adjacent to the fold line of the flaps has been found to give a sharper, cleaner bend to the carton than is accomplished with a simple rotating bending mechanism.

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

1. In combination with a conveyor for advancing generally rectangular cartons in step by step fashion, said cartons being open and having flaps hingedly connected to the end walls thereof and projecting thereabove, means for closing said end flaps at one position on said conveyor comprising, longitudinally spaced supports projecting above said conveyor and located alongside thereof, levers pivotally supported on said supports and swingable about axes transverse to said conveyor, springs connected to the swinging ends of said levers and biasing said levers inwardly and downwardly relative to a carton positioned therebetween, transversely extending pins rotatably mounted on the swinging ends of said levers and projecting transversely over said conveyor and cartons thereon, flap closing blades secured to said pins over said conveyor and having inwardly and downwardly turned fingers on their inner edges, cranks secured to said pins at an inwardly rotated angle from the blades thereon and relative to a carton therebetween, actuating links pivotally connected to the swinging ends of said cranks, cam and lever mechanism driven in timed relationship with said conveyor and connected to said links to reciprocate the same to oscillate said levers and cranks about their pivots, clamps angularly adjustably secured to said pins, stop portions on said levers engageable with said clamps to limit upward and outward rotation of said pins and cranks with respect to said levers and a carton positioned between said levers to resist and overcome the action of said springs tending to swing said pins and levers inwardly, said supports being spaced longitudinally along said conveyor a greater distance than the length of said cartons whereby said pins are positioned adjacent to the upper end edges of a carton on the conveyor when said levers are in their downwardly rotated positions, and adjustable stop means positioned to engage and limit the downward movement of said levers and pins.

2. In combination with a conveyor for advancing generally rectangular cartons in step by step fashion, said cartons being open and having flaps hingedly connected to the end walls thereof and projecting thereabove, means for closing said end flaps at one position on said conveyor comprising, longitudinally spaced supports projecting above said conveyor and located alongside thereof, levers pivotally supported on said supports and swingable about axes transverse to said conveyor, springs connected to the swinging ends of said levers and biasing said levers inwardly and downwardly relative to a carton positioned therebetween, transversely extending pins rotatably mounted on the swinging ends of said levers and projecting transversely over said conveyor, closing blades secured to said pins over said con-

veyor and having inwardly and downwardly turned flanges on their inner edges, cranks secured to said pins, actuating links pivotally connected to the swinging ends of said cranks, cam mechanism driven in timed relationship with said conveyor and connected to said links to oscillate said levers and cranks about their pivots, clamps secured to said pins, stop portions on said levers engageable with said clamps to limit upward and outward rotation of said pins and cranks with respect to said levers and a carton positioned between said levers to resist and overcome the action of said springs tending to swing said pins and levers inwardly, said supports being spaced longitudinally of said conveyor whereby said pins are positioned adjacent to the upper end edges of a carton on the conveyor when said levers are in their downwardly rotated positions, and stop means positioned to engage and limit the downward movement of said levers and pins.

3. In combination with a conveyor for advancing generally rectangular cartons in step by step fashion, said cartons being open and having flaps hingedly connected to the end walls thereof and projecting thereabove, means for closing said end flaps at one position on said conveyor comprising, levers pivotally supported at longitudinally spaced points alongside of said conveyor and swingable about axes transverse to said conveyor, springs connected to the swinging ends of said levers and biasing said levers inwardly and downwardly relative to a carton positioned therebetween, transversely extending pins rotatably mounted on the swinging ends of said levers and projecting transversely over said conveyor, closing blades secured to said pins over said conveyor, cranks secured to said pins, actuating links pivotally connected to the swinging ends of said cranks, and mechanism driven in timed relationship with said conveyor and connected to said links to reciprocate the same to oscillate said levers and cranks about their pivots, clamps secured to said pins, stop portions on said levers engageable with said clamps to limit upward and outward rotation of said pins and cranks with respect to said levers and a carton positioned between said levers to resist and overcome the action of said springs tending to swing said pins and levers inwardly, said levers being spaced longitudinally of said conveyor whereby said pins are positioned adjacent to the upper end edges of a carton on the conveyor when said levers are in their downwardly rotated positions.

4. Mechanism for folding a flap on the upper edge of the end wall of a carton comprising, a support spaced longitudinally from the end of the carton, a lever pivotally mounted on said support and swingable in a longitudinal plane toward said carton, a pin rotatably mounted on said lever and swingable therewith into transversely extending position closely adjacent the fold line between said flap and end wall, a folding blade projecting from said pin and having a laterally turned finger on the outer edge thereof engageable over the swinging edge of said flap, spring means for swinging said lever and pin downwardly, an adjustable stop limiting the downward movement of said pin, a crank arm on said pin arranged at an inwardly rotated angle from said blade relative to said carton, other stop means co-acting between said lever and said crank arm to limit rotation of said crank arm relative to said lever outwardly and upwardly relative to said carton, and an actuating link connected to the swinging end of said arm and moveable transversely of said arm to move said arm and other stop means into engagement with said lever to swing said lever upwardly in opposition to said spring means and to rotate said blade and pin away from said carton.



5. Mechanism for folding a flap on the upper edge of a wall of a carton comprising, a lever pivotally mounted to one side of and spaced from said wall and swingable in a plane normal to said wall, a pin rotatably mounted on said lever and swingable therewith into transversely extending position closely adjacent the fold line between said flap and wall, a folding blade projecting from said pin and having a laterally turned finger on the outer edge thereof engageable over the swinging edge of said flap, spring means for swinging said lever and pin downwardly, an adjustable stop limiting the downward movement of said pin, a crank arm on said pin, other stop means co-acting between said lever and said crank arm to limit rotation of said crank arm relative to said lever outwardly and upwardly relative to said carton, and actuating means connected to the swinging end of said arm and moveable transversely of said arm to move said arm and other stop means to engagement with said lever to swing said lever upwardly in opposition to said spring means and to rotate said blade and pin away from said carton.

6. Mechanism for folding a flap on the edge of a wall of a carton comprising, a lever pivotally mounted to one side of and spaced from said wall and swingable in a plane normal to said wall, a pin rotatably mounted on said lever and swingable therewith into transversely extending position closely adjacent the fold line between said flap and wall, a folding blade projecting from said pin, spring means for swinging said lever and pin downwardly, a crank arm on said pin, stop means co-acting between said lever and said crank arm to limit rotation of said crank arm relative to said lever outward and upward relative to said carton, and actuating means connected to the swinging end of said arm and movable transversely of said arm to move said arm and stop means into engagement with said lever to swing said lever upwardly in opposition to said spring means and to rotate said blade and pin away from said carton.

7. Mechanism for folding a flap on the edge of a wall of a carton comprising, a lever pivotally mounted to one side of and spaced from said wall and swingable in a plane normal to said wall, a pin rotatably mounted on said lever and swingable therewith into transversely extending position closely adjacent the plane of said wall, a folding surface extending axially along said pin and across said conveyor, spring means for swinging said lever and pin toward said carton, a crank arm on said pin, co-acting stop means on said pin and lever limiting outward and upward rotation of said pin with respect to said lever and carton, and actuating means connected to the swinging end of said arm to move said arm and said stop means into engagement with said lever to swing said lever upwardly in opposition to said spring means and to rotate said surface and pin away from said carton.

WAYNE A. WOOD.

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