April 5, 1966 A. E. RANDLES, JR 3,244,081

CARTON ERECTING MACHINE

Filed Nov. 26, 1963 7 Sheets-Sheet 1

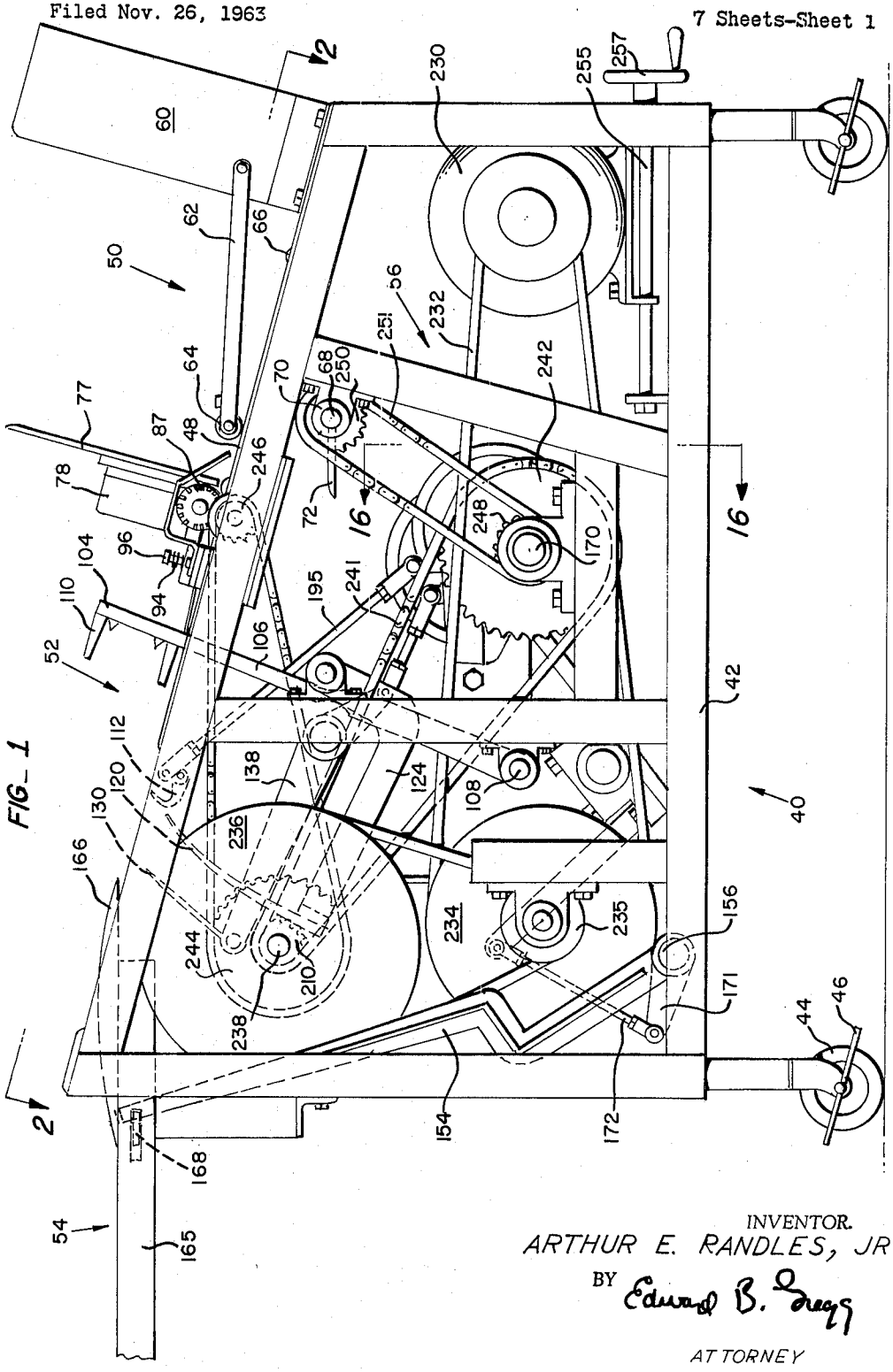



FIG. 1

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CARTON ERECTING MACHINE

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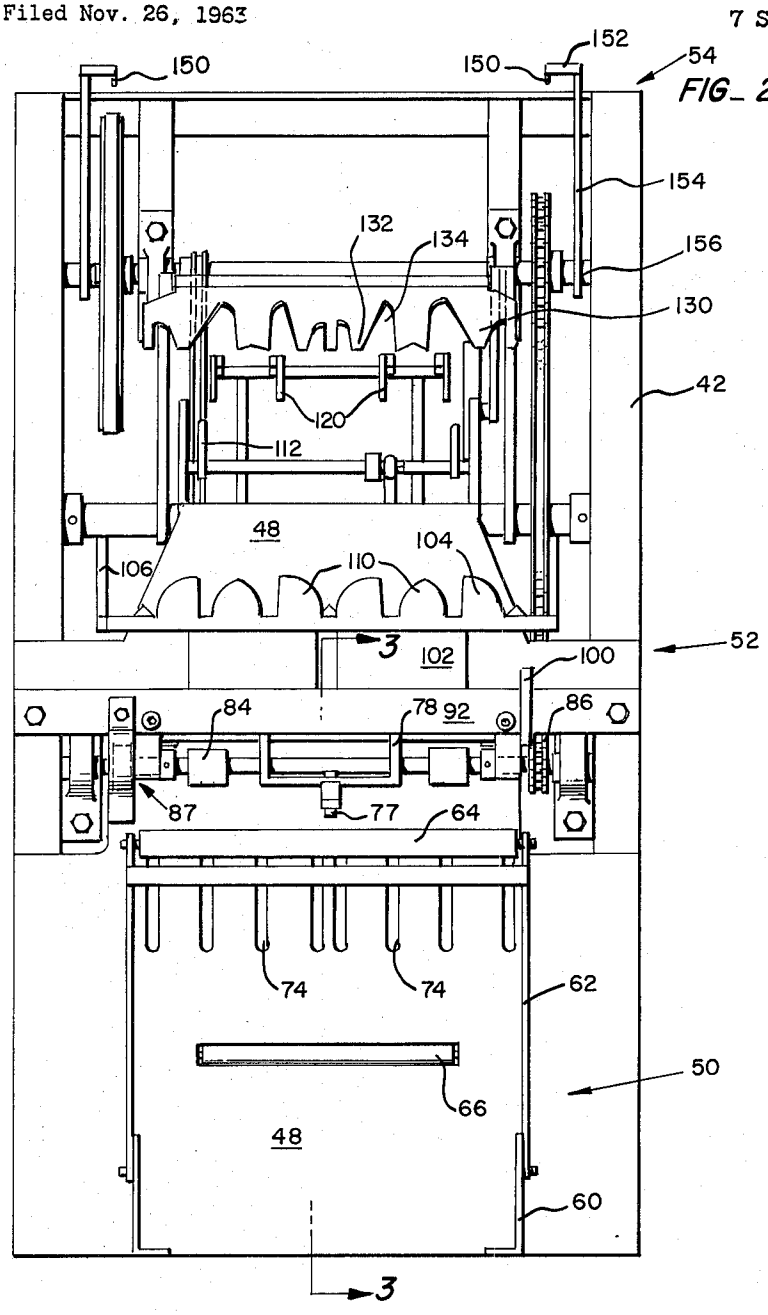



FIG_ 2

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CARTON ERECTING MACHINE

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FIG. 3

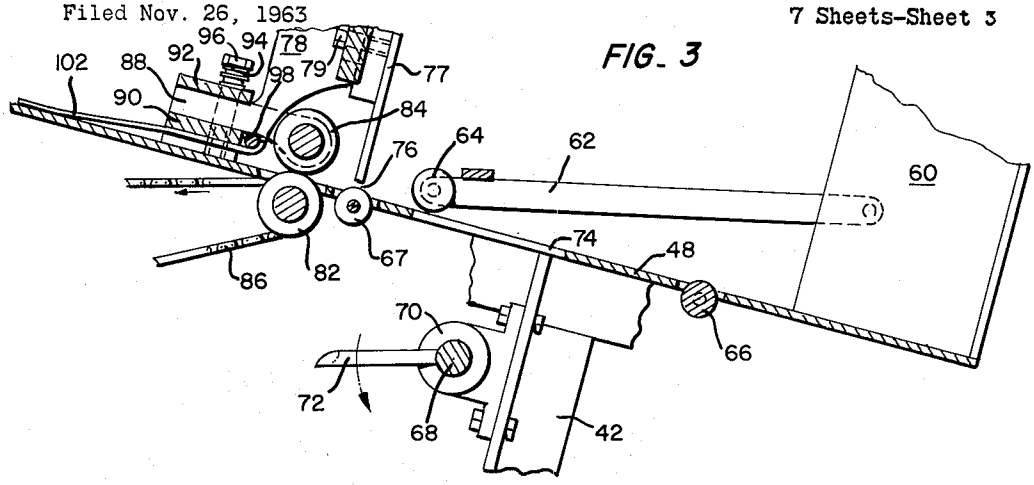



FIG. 17

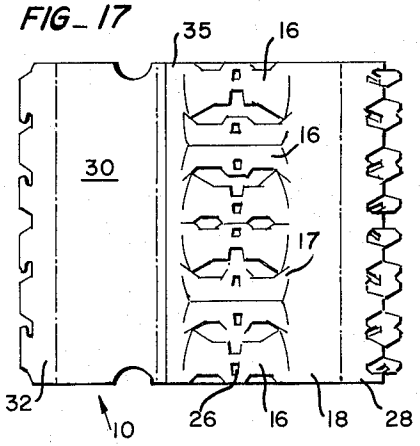



FIG. 18

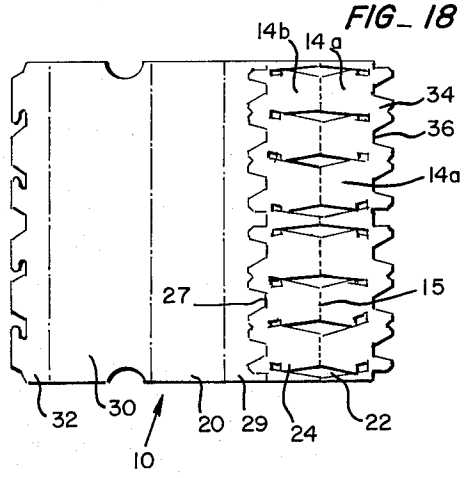
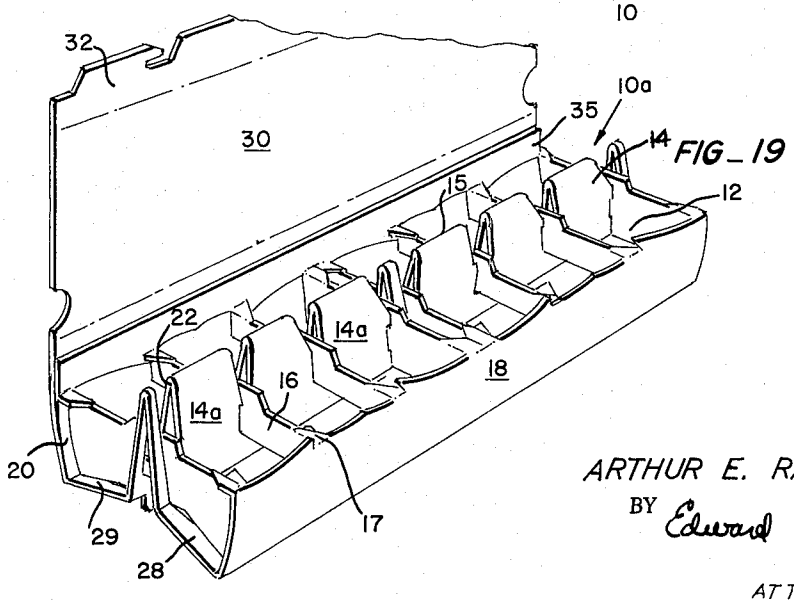



FIG. 19




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CARTON ERECTING MACHINE

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FIG_15

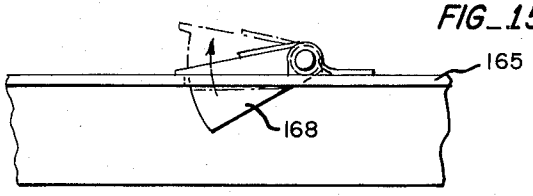



FIG_4

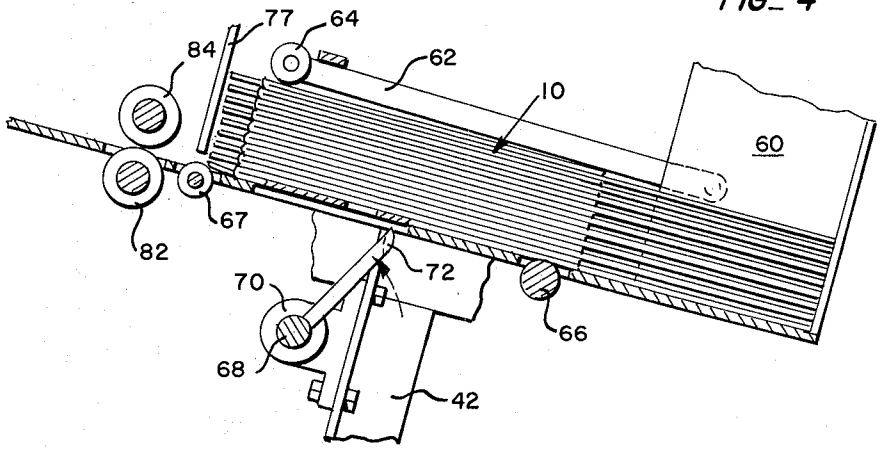



FIG_5

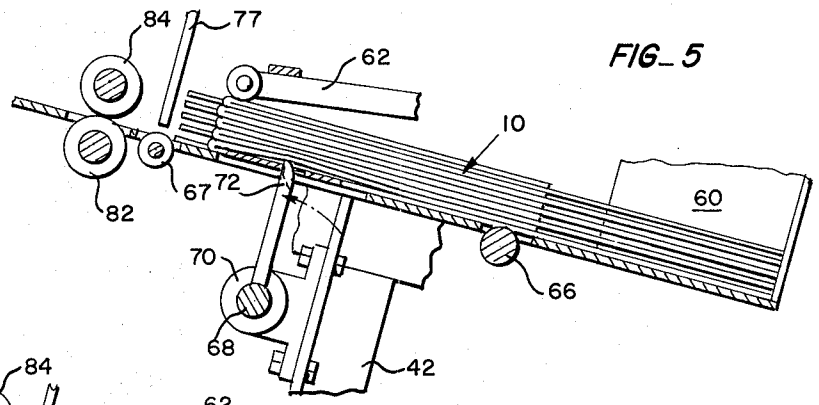
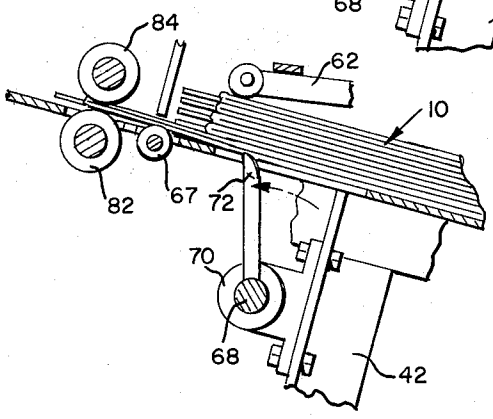



FIG_6




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FIG_7

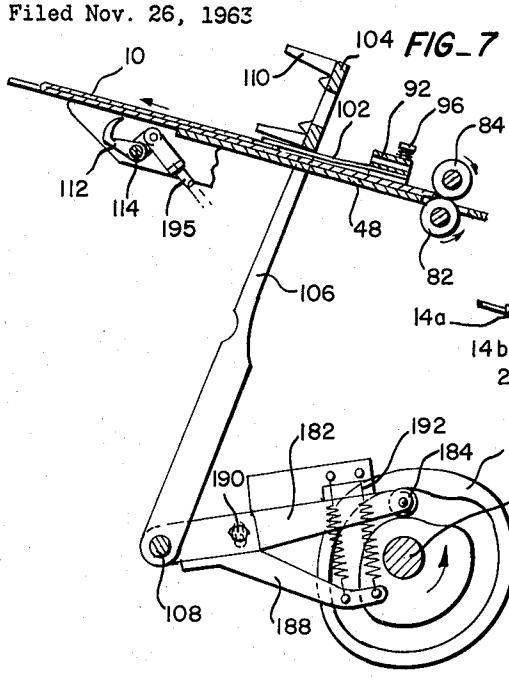



FIG_8

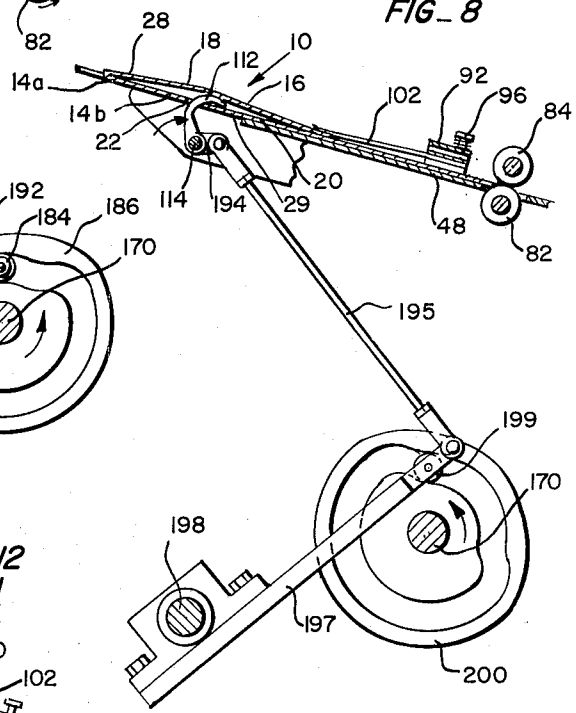



FIG_9

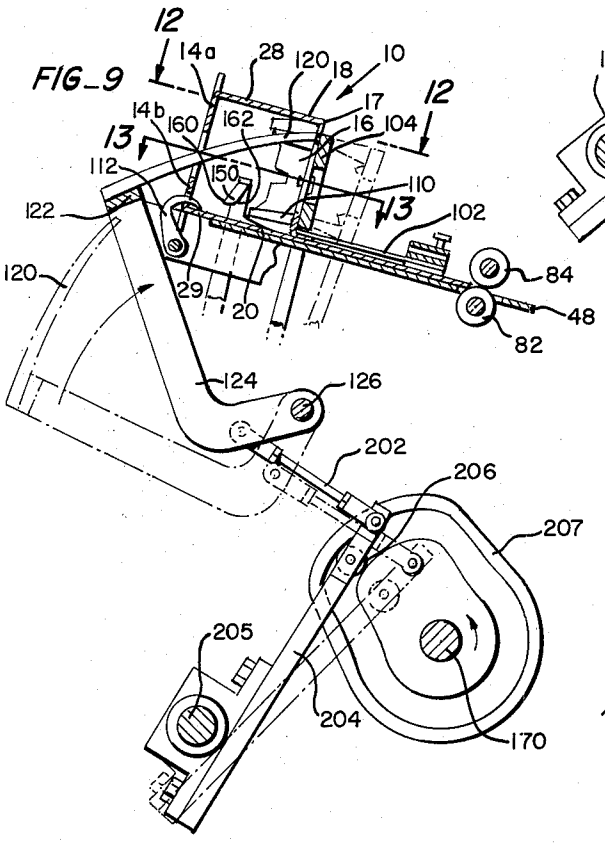
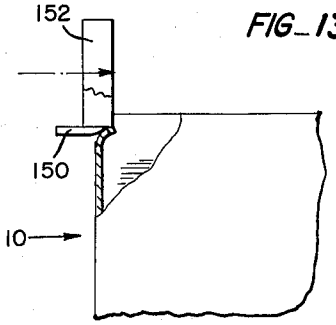



FIG_13




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FIG_16

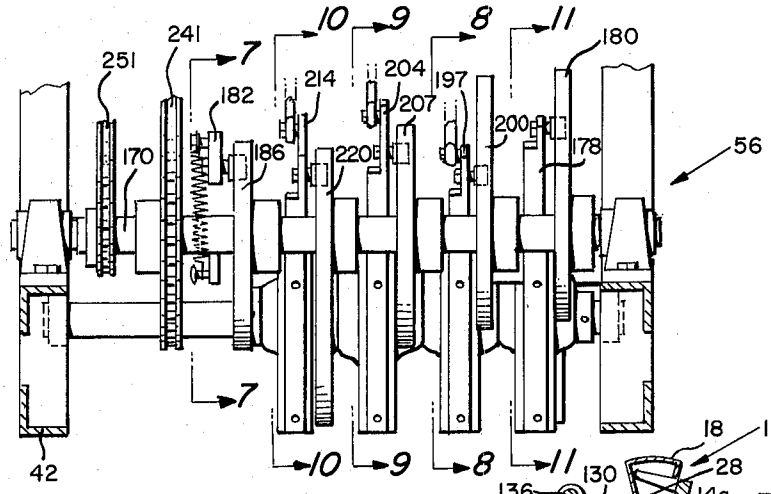
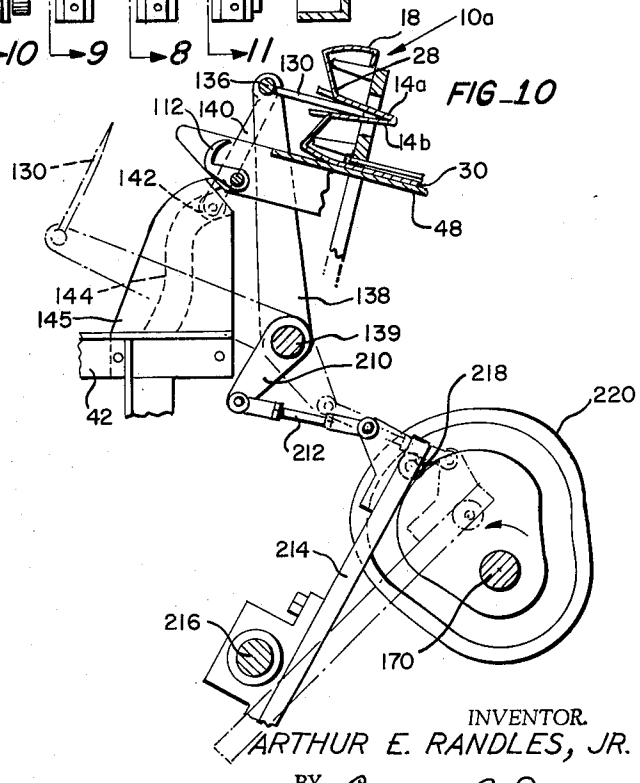



FIG_10




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CARTON ERECTING MACHINE

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FIG_11

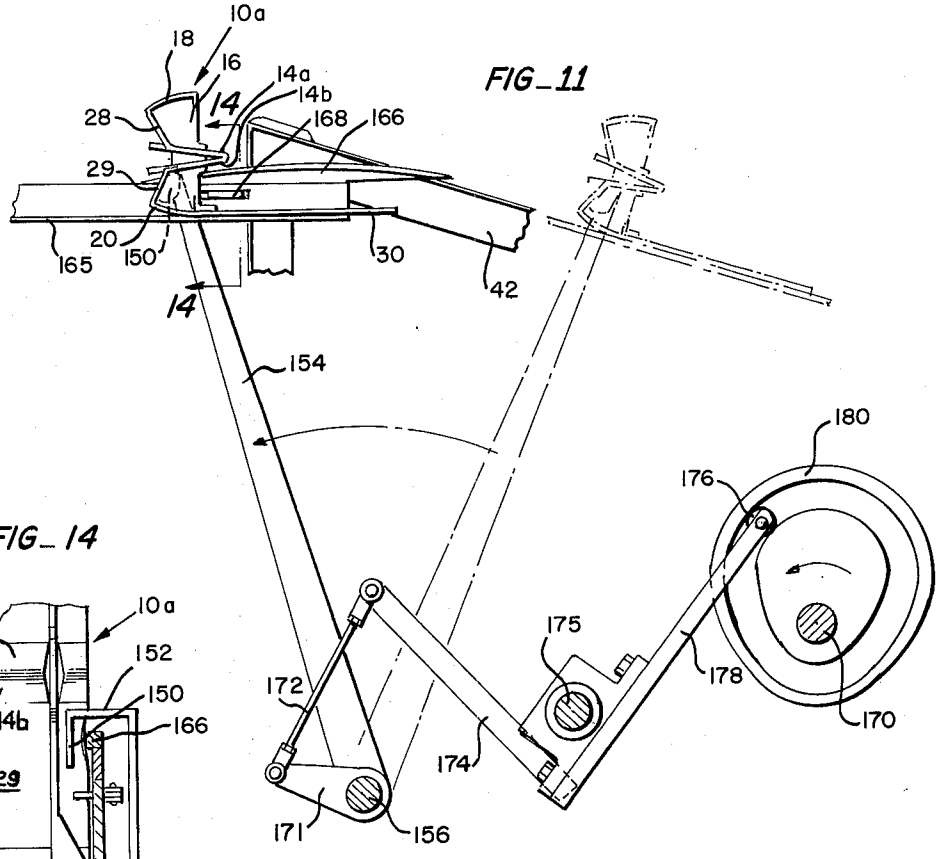



FIG_14



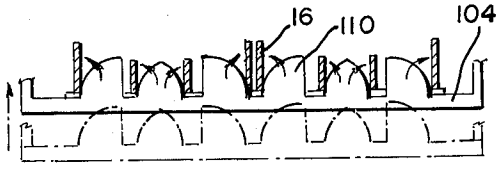




FIG_12

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United States Patent Office 3,244,081 Patented Apr. 5, 1966



3,244,081

# CARTON ERECTING MACHINE

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Filed Nov. 26, 1963, Ser. No. 325,883
8 Claims. (Cl. 93—37)

This invention relates to a carton erecting machine and, more particularly, to a machine for erecting cellular egg cartons from carton blanks in the form of collapsed tubular members. This application is a continuation-in-part of my copending application Serial No. 256,667 filed February 6, 1963 for "Egg Carton Setup Machine," now abandoned.

Egg cartons are commonly formed of semi-rigid sheet material, such as fiber board or cardboard which has been cut, scored and glued to provide a carton blank made up of a plurality of panels hingedly connected to form in part, a collapsed tubular member. Such cartons when assembled include front and rear walls, forward and rearward bottom walls and a pair of upstanding converging divider panels which interlock with a series of transverse partitions to form a series of cells for the reception of eggs or the like. Such cartons also usually include a cover panel which is attached to the rear wall along a score line to fold over the tops of eggs within the cells.

Machines have been developed to erect such egg cartons from a collapsed tubular carton blank and typical of such machines is that shown in my U.S. Patent No. 2,935,917 issued May 10, 1960.

This machine works satisfactorily, particularly in the erecting and assembly of such egg carton but some difficulty has been experienced in providing a reliable feed mechanism for the delivery of the carton blanks to an assembly station and a satisfactory ejector mechanism for the delivery of the completely assembled carton to a collection point.

It is, therefore, an object of this invention to provide a machine for receiving carton blanks in collapsed tubular form and erecting the blanks into cellular cartons for reception of eggs or the like.

It is a further object of this invention to provide a machine that will automatically feed carton blanks one at a time to an assembly station.

It is a further object of this invention to provide a carton set-up machine including positive means for engaging an assembled carton and moving it from the assembly table onto a delivery table where it is nested with others.

It is a further object of this invention to provide an egg carton assembly machine that is economical to manufacture and reliable in operation.

In carrying out this invention, I provide an egg carton assembly machine including a table having a feed mechanism at one end, a delivery mechanism at the other end and an assembly station intermediate the ends of the table. The carton blanks are formed of a series of panels connected along score lines and one end of the sheet from which they are formed is folded back over the sheet and glued to it so that one end of the carton blank has top and bottom panels. The carton blanks are arranged in the feed mechanism so that the ends having double panels are disposed toward the delivery end of the machine. Then, a series of radial fingers which are mounted on a rotating member below the table swing through an arc to extend through slots in the table and enter into perforations in the bottom panel of the carton and, because there are no aligned perforations in the upper panel, the fingers can engage one, and only one, carton to pull it toward the delivery end of the machine and into an opposing pair of feed rollers. Since the double paneled end of the blank, and hence, the perforations are disposed toward the leading end, the carton blank is for all practical purposes



pulled, rather than pushed, toward the feed rollers. Consequently, there is less tendency for the carton to bend or buckle. From the feed rollers the carton is moved to an assembly station wherein it is engaged first by an opening hook that swings from below the table up through a perforation in the bottom panel to lift the upper panels slightly and, at the same time, hold the lower panels against the table. Then, while the carton blank is so held, a series of opening fingers swing up from below the table to enter through perforations in the carton and engage the upper panels and elevate them into fully open position at which time the body of the carton blank is of open tubular configuration of rectangular cross section with the panel of transverse dividers disposed upright and facing the rear of the machine. This panel is then engaged by an erecting head having forwardly disposed projections which fold the partitions toward the opposite upright panel. Finally, a rib forming plate engages a score line across that opposite upright panel and forces it back to form the rib or longitudinal divider panel which interlocks with the transverse partitions.

After the opening fingers have erected the carton blank to its fully open tubular condition, a pair of arms which are pivotally mounted at opposite sides of the machine, carry a pair of fingers having rounded trailing surfaces back toward the opened carton blank. The rounded edges of the fingers engage the edges of the assembled carton and cam by them to a position of rest within the area bounded by the carton panels. Then, after the rib former plate completes assembly of the carton, the arms are moved forward so that the fingers engage the carton edges to carry the panels toward the delivery table. During this latter movement the side edges of the carton are engaged by friction plates to restrain the carton against excessive movement out of the desired path. Finally, the carton engages a spring biased pivot finger and swings the finger out of its path. The spring returns the finger after the carton passes to extend behind it and prevent reverse movement thereof. At the end of the delivery table the cartons are nested into a compact stack for removal.

Other objects and advantages of this invention will become apparent from the description following when read in conjunction with the accompanying drawings wherein:

FIG. 1 is a side elevation of an egg carton forming machine embodying features of this invention;

FIG. 2 is a top plan view taken along the plane of line 2—2 of FIG. 1;

FIG. 3 is a section view taken along line 3—3 of FIG. 2;

FIGS. 4, 5 and 6 are section views similar to FIG. 3 showing different cycles of a carton blank feeding operation;

FIGS. 7, 8, 9, 10 and 11 are section views taken along lines 7—7, 8—8, 9—9, 10—10 and 11—11 of FIG. 16;

FIGS. 12 and 13 are section views taken along lines 12—12 and 13—13 of FIG. 9;

FIG. 14 is a section view taken along line 14—14 of FIG. 11;

FIG. 15 is a partial plan view of the carton delivery table;

FIG. 16 is a section view taken along line 16—16 of FIG. 1;

FIGS. 17 and 18 are plan views showing opposite sides of a carton blank; and

FIG. 19 is a view in perspective showing a fully assembled egg carton.

*The carton being erected*

Now referring more particularly to FIGS. 17, 18 and 19, I have shown an egg carton 10*a* formed from a carton blank 10. The assembled carton has a plurality of compartments or cells 12 for the reception of eggs or the like.

The cells 12 are formed by a divider 14 comprising panels 14*a* and 14*b* which are hingedly connected along a score line 15 to form an inverted V-shaped rib which functions as a longitudinal divider panel, and a series of transverse partitions 16 which are hingedly connected at 17 between the front and rear walls 18 and 20 of the carton so as to be turned from their co-planar relationship in the carton blank 10 to the upright position in the completed carton 10*a* of FIG. 12 wherein they engage and interlock with the longitudinal divider panels 14*a* and 14*b*, being received in a series of V-shaped aperture 22 which converge in opposite directions from the score line 15 (FIG. 18) to form hooks 24 which engage in openings 26 in the transverse dividers to form the interlocking engagement. Other panels included in the carton are the front and rear bottom panels 28 and 29, the top lid panel 30 and the closure flap 32. Additionally, tabs 34 may be provided to extend from the central separator panel 14 to provide additional rigidity and function as additional support members.

It will be noted in FIGS. 17 and 18 particularly, that the carton blank 10, formed of the sheet fiber board or the like, is folded over at the score line 36 which connects the forward bottom panel 28 to the upstanding central divider 14*a* so that the entire divider panel 14*a* and 14*b* is on one side of the carton blank. For reasons that will become apparent, the carton blanks will be arranged in the machine with the bottom panels 14, and hence the apertures 22 disposed downward with the panels 16, 18 and 28 overlying the apertures 22. The panel bearing the cross partitions 16 is adhesively attached at 35 to the back panel 20.

*General structure of machine*

Now referring to FIG. 1 the carton forming machine 40 includes suitable framework 42 and may be supported on wheels 44 which preferably include suitable means shown generally at 46 for locking the wheels against rotation. The machine also includes a supporting table or deck 48 along which the carton blanks 10 are fed and erected as will hereinafter be described. Preferably, the supporting table is inclined upwardly from the feed end although the invention is not limited to that particular arrangement. With the table 48 inclined upwardly, the carton blanks are fed positively unaided by gravity. As a further practical advantage, I have found that the machine 40 may be positioned above an incoming conveyor without making the feed end of the table 48 where the operator works too high. Spaced along the machine 40 are the feed mechanism 50, the assembly station 52 and the delivery table 54. Also supported on the frame 42 are the drive mechanisms 56. Each of these mechanisms will be described in greater detail hereinafter.

*Feed mechanism*

Referring now to FIGS. 1 and 3 to 6 the feed mechanism 50 includes a magazine 60 having upright walls against which a stack of carton blanks may be aligned while supported on the table 48. The magazine is supported perpendicular to the deck 48 so that gravity tends to keep the carton blanks in alignment. Pivotally connected to the sides of the magazine 60 are arms 62 rotatably supporting between them a pressure roller 54. The arms 62 and roller 64 are relatively heavy and may be placed on a stack of carton blanks to press them against the table 48 to insure that the lowermost carton is positioned for proper feeding. Extending through slots in the table or deck 48 are two or more anti-friction rollers 66 and 67 which provide rolling rather than sliding contacts for cartons removed from the bottom of a stack.

Rotatably mounted below the table 48 is a shaft 68 rotatably journaled in suitable bearings 70 secured to the frame 42. Extending from the shaft 68 is a plurality of radial pick-off fingers 72 which are disposed in axial alignment with a corresponding series of slots 74 (FIG. 2)



in the table 48 and are of such a length that their ends extend through the slots during the top portion of the arc through which they move. During that state of their rotational movement as shown in FIGS. 4 to 6, the pick-off fingers engage in the apertures 22 in the bottom panel 14*a*, 14*b* of the lowermost carton blank 10 and pull it forward, over the anti-friction rollers 66 and 67 and through a gate or passage 76. The passage 76 is provided by a barrier bar 77 adjustably positioned on a bracket 78 to restrict the passage 76 to a single carton blank 10. Adjustment of the bar 77 may be accomplished by a bolt and slot arrangement 79. When a carton blank 10 is released by the fingers 72 at the completion of the upper arcuate movement the fingers 72 swing down below the table 48 and back around for engagement for the next carton. Because the lower panel 14*a*, 14*b* of the carton blank 10 which contains the apertures 22, is opposed by relatively solid panels 16, 18 and 28 without apertures, the fingers 72 can positively engage only the lowermost carton to feed one at a time. However, the stop barrier bar 77 is also provided to insure that other carton blanks are not dragged through.

Because the apertures 22 are disposed toward the leading end of the carton, the carton is essentially pulled, rather than pushed, through the opening 80 in conventional devices so that bending and buckling of the carton blank is avoided.

After the carton blank 10 passes under the barrier 77, the pick-off fingers 72 pull it between a pair of opposing pressure feed or pull rolls 82 and 84, one of which 82 is driven by means of a chain 86 and drives the other 84 through gear engagement 87 hereinafter to be described. The upper pull roll 84 is carried between a pair of bracket arms 88 which are held between plates 90 and 92 and biased downward by a spring 94 on the bolt 96 so that it is free to yield under pressure such as may be caused by jamming. A rod 98 has flat portions disposed under the bracket arms 88 so that partial rotation of the rod by means of handle 100 (FIG. 2) at one side of the machine raises the bracket 88 to free the roll 84 from contact with the driven roll 82.

The pull rolls 82 and 84 draw the lowermost carton through the gate 76 and under a carton cover clamp 102 which is formed of spring steel or the like to engage the carton blank fixedly and clamp the cover against forward movement after it passes through the pull rolls 82 and 84.

*Carton assembly mechanisms*

After release by the pull rolls 82 and 84 the cover clamp 102 stops the carton blank 10 in the position shown in FIG. 7 with the double paneled body portion of the carton blank extending beyond the end of the cover clamp 102 and beyond a cell breaker member 104 that bridges the table 48 on the ends of arms 106 which are pivotally mounted at 108 to the frame 42. As shown best in FIGS. 2 and 12, the cell breaker 104 has a series of cam-like projections 110 which are adapted to engage the transverse cell dividers 16 and fold them downwardly as shown in FIGS. 9 and 12.

However, prior to this, one or more hook members 112 which are pivotally mounted at 114 on the frame 42 are pivoted from a normal position below the table 48 as shown in FIGS. 1 and 7 to swing in an arc upwardly and rearwardly through an aperture 22 in the carton blank, first to engage the upper panels 16, 18 and 28 and fold them upward slightly, but primarily to clamp down against the trailing portion 20, 29 of the lower carton blank panels. Specifically, the hook is positioned to enter the perforations 22 at a point adjacent the score line 27 (FIG. 18) to hold the panels 20 and 29 down and insure that elevation of the upper panels 16, 18 and 28 will result in full erection of the carton blank. After the carton is engaged by the hook 112 a series of blank opener fingers 120 mounted on a bar 122 which is carried on a pair of arms 124 pivoted at 126 on the frame 42 swing

upwardly and rearwardly from below the table through the apertures **122** to engage the panel **16** adjacent the score line **17** and raise it to an upright position with the more generally horizontal front panel **18** folded about the scoreline **17**.

As soon as the panel **16** is in upright position, the cell breaker **104** is pivoted forward, as shown in FIG. 9 into engagement with the carton blank panel **16** in which the transverse dividers are formed. The cell breaker **104** may be of one-piece construction with cam projections **110** cast integral. In any event, it is merely the force of the projections **110** against the transverse dividers that forces them to turn away from their original plane. Thus, at this stage the carton blank is opened to the tubular condition shown in FIG. 9 with the cell dividers **16** extending transverse to the plane of the panel in which they were originally situated and toward the upright longitudinal separator panels **14***a* and **14***b*.

After erection of the carton blank **10** into open tubular configuration with transverse dividers extended, the hook **112** and blank opener fingers **120** are withdrawn to their normal positions below the table **48** as the rib former plate **130** (FIGS. 1, 2 and 10) is operated to complete assembly of the egg carton **10***a*. As shown best in FIG. 2 the rib former plate **130** includes a series of blade-like projections **132** which are formed and disposed so that each engages a section of the score line **15** intermediate the apertures **22**. The spaces **134** between the projections **132** are arranged to accommodate the transverse cell dividers **16** which, as has been described in connection with FIGS. 9 and 12 are extending toward the panels **14***a* and **14***b* at the commencement of the operation of the rib former **130**. As will be noted in FIG. 10 the rib former **130** is pivotally mounted at **136** between a pair of arms **138** which, in turn, are pivotally mounted at **139** to the frame **42**. Carried on the shaft **136** is a guide arm **140** carrying a cam follower roller **142** at the free end thereof to engage in a cam track in a cam plate **145** carried on the frame **42**. The cam track is designed so that as the rib former support arms **138** pivot from the position shown in phantom in FIG. 10, the control arm **140** maintains the rib former plate **130** in a relatively fixed plane transverse to the plane of the carton panels **14***a* in FIG. 9 so that the panels **14***a* and **14***b* are driven straight into interlocking relationship with the transverse partitions **16**.

Thus, the rib former works in conjunction with the cell breaker to engage the central divider panels **14***a* and **14***b* at the score line **15** to force them inwardly toward the transverse dividers **16** which engage between the rib former blades **132** and, hence, in the apertures **22** until the hooks **24** engage in the openings **26** in the transverse dividers **16** to interlock the transverse dividers and the longitudinal separator panels and complete formation of the egg carton.

*Delivery table*

Referring now to FIGS. 1, 2, 9, 11 and 13 to 15, the carton is removed from the assembly station by means of a pair of ejector fingers depending from brackets **152** on the end of the ejector arms **154** which are pivotally mounted at **156** to the frame **42**. The ejector fingers **150** are formed with a relatively straight leading edge **160** and a curved trailing cam edge **162**. The cam edge **162** is arranged to cam aside the edges of carton panel as it swings from its normal position shown in FIG. 1 and to the position shown in FIG. 9 wherein it reaches a period of dwell within the open tubular carton blank form. Then, after the carton is assembled around it, the fingers **150** move forwardly to carry the carton from the assembly station shown in phantom in FIG. 11 to the delivery table **165**. It will be noted that the leading edge **160** is sloped at substantially the angle of the bottom panel **129** of the completed egg carton since the fingers push against this particular panel in removing the carton.

During movement of the carton on the ejector fingers **150**, the carton is frictionally engaged between parallel stabilizer plates **166** which, as shown in FIG. 14, are spaced slightly less than the length of the carton **10***a* to grip it and restrain it against skipping, flopping or otherwise moving outside its intended path of travel to the delivery table **155** so that each succeeding carton will travel the same path and be nested at the delivery table **165**. At the delivery table **165**, the carton moves by oppositely disposed spring mounted ejector catches **168** (FIG. 15) which have a restraining surface to prevent reverse movement of the cartons.

*Drive mechanism*

The means for driving the egg carton assembling and delivering mechanism includes a common cam shaft **120** from which practically all of the elements are driven. For example, the pivotal movement of the ejector arm **154** just described in connection with FIG. 11 is accomplished by pivoting a short arm **171** secured to the shaft **156** through a link **172** pivotally connected to one arm of a bell crank lever **174** which is pivotally mounted on the frame **42** at **175** and rocked in response to engagement of a cam follower **176** on the other arm **178** with a cam **190** on the common shaft **170**.

Referring again to FIG. 7, the short pivotal movement of the cell breaker arm **106** is accomplished by means of an arm **182** carrying a cam follower **184** operatively engaged in a cam **186** on the cam shaft **170**. Arm **182** is not rigid with arm **106** and the connection between them permits a certain amount of play so that the cell breaker **104** can adjust itself to different size cartons or cartons not precisely placed on the table. Thus, an arm **188** which is secured to the shaft **108** so as to be rigid with arm **106** is attached to the arm **182** by a bolt and slot connection **190** that permits a certain amount of free play with springs **192** normally urging the arms **188** and **182** into the position shown in FIG. 7. Thus, if a large size carton is presented to cell breaker **104** the rib former plate **130** will drive the panels **14***a* and **14***b* into full engagement but the cell breaker will yield somewhat against the springs **192**.

Referring to FIG. 8, the pivotal movement of the hook **112** is produced by means of a short arm **194** secured to the shaft **114** on which the hook is carried with a link **195** being connected to a cam follower carrier arm **197** pivoted at **198** about the frame **42** with the cam follower **199** engaged in a cam **200** on the common cam shaft **170**.

In FIG. 9 the pivotal movement of the carton blank opener support arms **124** about pivot **126** is produced by means of a link **202** carried on an arm **204** pivotally mounted at **205** and having a cam follower **206** engaged with a cam **207** on the common cam shaft **170**. Similarly, as shown in FIG. 10, the rib former plate **130** is pivoted by means of a short arm **210** rocked by a link **212** carried on an end of an arm **214** pivotally mounted at **216** on the frame **42** and carrying a cam follower **218** engaging a cam **220** on the common cam shaft **170**.

As specifically shown in FIG. 16, all of the cams are carried on the same cam shaft **170** so that they can easily be timed for operation in the desired sequence. The cam shaft is driven by means of a motor **230** (FIG. 1) which drives the common cam shaft **170** through belt **232** pulleys **234**, **235** and **236** to drive shaft **238**, and from sprocket **240** on shaft **238** and chain **241** to sprocket **242** on the common cam shaft **170**. A second sprocket **244** on shaft **238** drives a sprocket **246** on the lower pull roll **82** so that the rolls **82** and **84** are also driven in timed relation to the operation mechanism.

A sprocket **248** on the cam shaft drives a sprocket **250** through chain **251** to rotate the pick-off fingers **72** in timed relation to the operating mechanism. Tension of the drive belt **232** may be adjusted by moving the motor **230** along threaded rods **255** by turning the wheel **257**.

*Sequence of operation*

In the sequence of operations, the radial pick-off fin-

gers 72 (FIG. 3) rotate around until, during the upper period of the arc through which they travel, they extend through the openings 74 in the table 48 and through the apertures 22 at the lower panel of the carton blank 10 to move the carton blank forward into engagement between the pull rollers 82 and 84. There the cartons are fed forward under the cell breaker 104 against the frictional resistance of the carton blank pull down plate 102 (FIG. 7) until the body portion of the carton is positioned forwardly of the cell breaker. Then, the hook finger is pivoted up through the carton aperture 22 to clamp one of the lower panels 29 against the table. Then, the array of carton opening fingers 120 is pivoted up to open the carton to its fully opened tubular condition shown in FIG. 9. At this time, the ejector fingers 150 are moved rearwardly from the solid line position shown in FIG. 11 and, after the curved portion of the fingers 150 are cammed past the carton panels 14*a* (FIG. 13) the fingers 150 come to rest in the position shown in FIG. 9. Then, the rib former plate 130 (FIG. 10) is pivoted to the rear wtih its attitude controlled by guide arm 140 and cam 144 to engage the score line 15 joining the center divider panels 14*a* and 14*b* and fold them inwardly into interlocking engagement with the transverse cell dividers 16. Finally, the rib former is withdrawn and ejector fingers 150 are moved forwardly to carry the carton between the restraining plates 166 and past the restraining fingers 168.

While this invention has been described in connection with the preferred embodiment thereof, it is apparent that modifications and changes therein may be made by those skilled in the art without department from the invention as defined by the claims appended hereto.

Having described my invention, I claim:

1. A machine for erecting cartons from carton blanks each of which has a plurality of panels hingedly connected in collapsed tubular form, said machine including:
- an elongated table,
- means on said table for supporting a stack of said blanks,
- means for feeding one carton at a time from said stack to an assembly station on said table,
- means for erecting said tubular blank at said assembly station, and
- means for advancing erected cartons from said assembly station comprising:
- a pair of arms mounted for pivotal movement in vertical planes along opposite sides of said table,
- inwardly extending fingers at the free ends of said arms positioned to engage opposite edges of a carton on said table,
- each of said fingers having a forward carton-pushing surface and a smoothly curved trailing cam surface adapted to bend away and pass the edge of a carton engaged thereby, and
- means for moving said arms in unison after said carton erecting means have opened a blank to open tubular form to carry said fingers from a position below said table and forward of said assembly station in sequence above said table and rearward to engage and cam past opposite edges of said open tubular carton blank and then to move said fingers forward after operation of the carton erecting means is complete to engage opposite edges of a carton panel and move the carton forwardly.

2. The carton erecting machine defined by claim 1 including
- mean frictionally engaging opposite edges of a carton during said forward movement thereof.

3. The carton erecting machine defined by claim 1 including
- a pair of restraining members pivotally mounted at opposite sides of said table, and
- yieldable means biasing said restraining members into the path of a carton during said forward movement.

4. A machine for erecting cartons from carton blanks each of which has a plurality of panels hingedly connected to form a collapsed tubular member including a lower panel with at least one aperture toward one end thereof and an upper panel overlying said aperture, said machine including:
- an elongated table with an opening therethrough at one end thereof for supporting a stack of carton blanks with the apertures in the lower panels of said blanks in registry with said table opening and said one ends of said blanks disposed forwardly,
- a pick-off mechanism including,
- a member mounted for rotation below said table about an axis transverse thereto, and
- a radial pick-off finger on said member of a length and so disposed that the end thereof moves through an arc during a portion of the rotation of said member to move upwardly and forwardly through said opening and the aperture in the lowermost carton blank in a stack on said table to pull said lowermost carton blank forwardly of said stack,
- means for then feeding said lowermost carton blank to an assembly station on said table,
- means for erecting said lowermost carton blank at said assembly station, and
- means for advancing erected cartons from said assembly station comprising:
- a pair of arms mounted for pivotal movement in vertical planes along opposite sides of said table,
- inwardly extending fingers at the free ends of said arms positioned to engage opposite edges of a carton on said table,
- each of said fingers having a forward carton-pushing surface and a smoothly curved trailing cam surface adapted to bend away and pass the edge of a carton engaged thereby, and
- means for moving said arms in unison after said carton erecting means have opened a blank to open tubular form to cary said fingers from a position below said table and forward of said assembly station in sequence above said table and rearward to engage and cam past opposite edges of said open tubular carton blank and then to move said fingers forward after operation of the carton erecting means is complete to engage opposite edges of a carton panel and move the carton forwardly.

5. The carton erecting machine defined by claim 4 including
- means frictionally engaging opposite edges of a carton during said forward movement thereof.

6. The carton erecting machine defined by claim 4 including
- a pair of restraining members pivotally mounted at opposite sides of said table, and
- yieldable means biasing said restraining members into the path of a carton during said forward movement.

7. A machine for erecting egg cartons from carton blanks each of which has a plurality of panels hingedly connected to form a collapsed tubular member including a lower panel with a plurality of apertures toward one end thereof and upper panels overlying said lower panel, one of said upper panels having hinged partitions, said machine including:
- an elongated table with openings therethrough at the trailing end thereof for supporting a stack of carton blanks with the apertures in the lower panels of said blanks in registry with said table opening and said one ends of said blanks disposed forwardly,
- a pick-off mechanism including,
- a member mounted for rotation below said table about an axis transverse thereto, and
- at least one radial pick-off finger on said member of a length and so disposed that the end thereof moves through an arc during a portion of the rotation of said member to move upwardly and forwardly through said opening and the apertures in the low-

ermost carton blank in a stack on said table to pull said lowermost carton blank forwardly of said stack,

means for the moving said lowermost carton blank to an assembly station on said table,

an upright erecting head at said assembly station facing the trailing end of said table operable when engaged by a said one upper panel to fold said hinged partitions toward said trailing end,

a blank opening hook movable upwardly from a position below said table to enter an aperture in said carton blank at said assembly station and engage and partially lift said upper panels,

an array of erecting fingers movable upwardly and rearwardly from a position below said table to enter apertures in said carton blank and engage said upper panels and lift them to fully open tubular position with said one upper panel forced against said erecting head as said lower panel is disposed upright toward said training end of the table,

a folding plate movable upwardly and rearwardly to engage said lower panel and force it rearwardly into engagement with said hinged partitions to form an erected carton,

means for moving said opening hook, said array of erecting fingers and said folding plate in sequence, and

means for advancing erected cartons from said assembly station comprising:

a pair of arms mounted for pivotal movement in vertical planes along opposite sides of said table,

inwardly extending fingers at the free ends of said



arms positioned to engage opposite edges of a carton on said table,

each of said fingers having a forward carton pushing surface and a smoothly curved trailing cam surface adapted to bend away and pass the edges of a carton engaged thereby, and

means for moving said arms in unison after operation of said opening fingers to carry said fingers from a position below said table and forward of said assembly station in sequence above said table and rearward to engage and cam past opposite edges of an open tubular carton blank and to then move said fingers forward after operation of said folding plate is complete to engage opposite edges of a carton panel and move the carton forwardly.

8. The carton erecting machine defined by claim 7 including

a pair of restraining members pivotally mounted at opposite sides of said table, and

yieldable means biasing said restraining members into the path of a carton during said forward movement.

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