

Jan. 31, 1961

T. E. GRADE ET AL

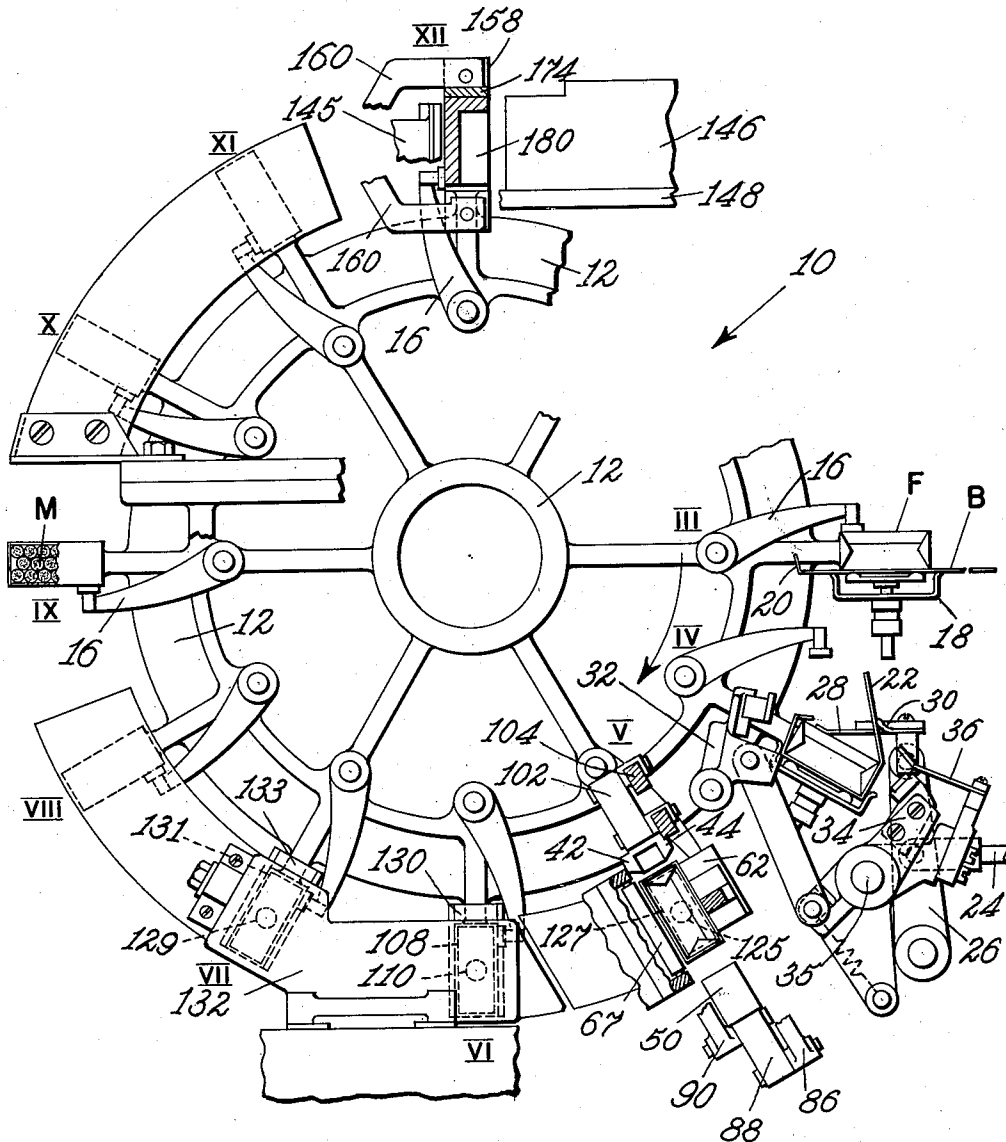
2,969,631

CIGARETTE PACKAGING MACHINE

Filed March 9, 1959

6 Sheets-Sheet 1

FIG.1



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6 Sheets-Sheet 2

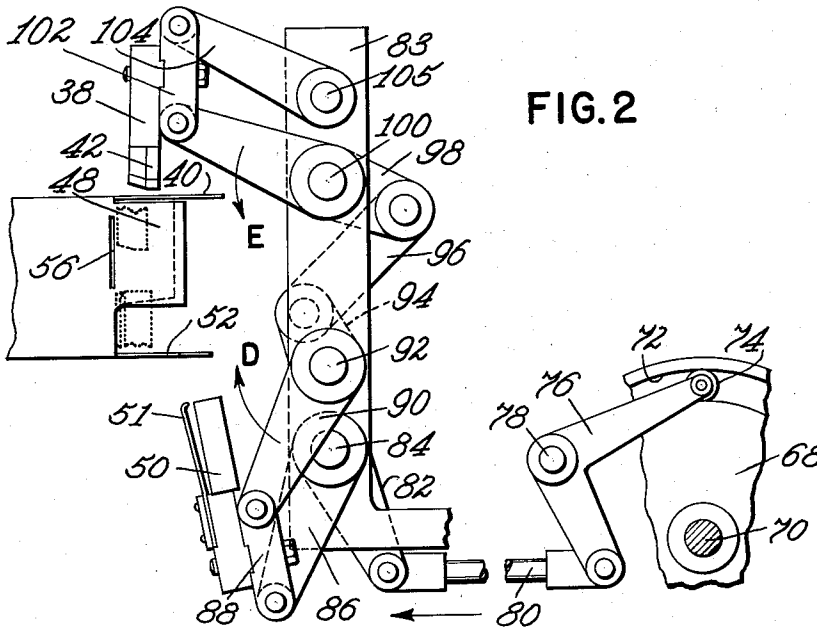


FIG. 2

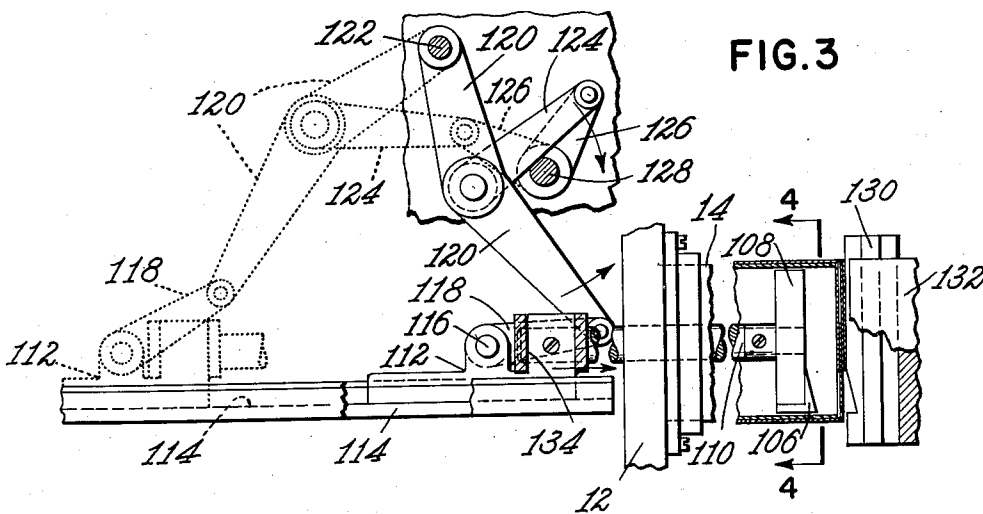


FIG. 3

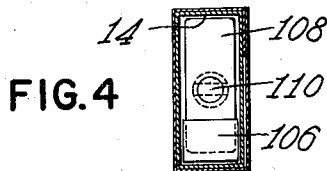


FIG. 4

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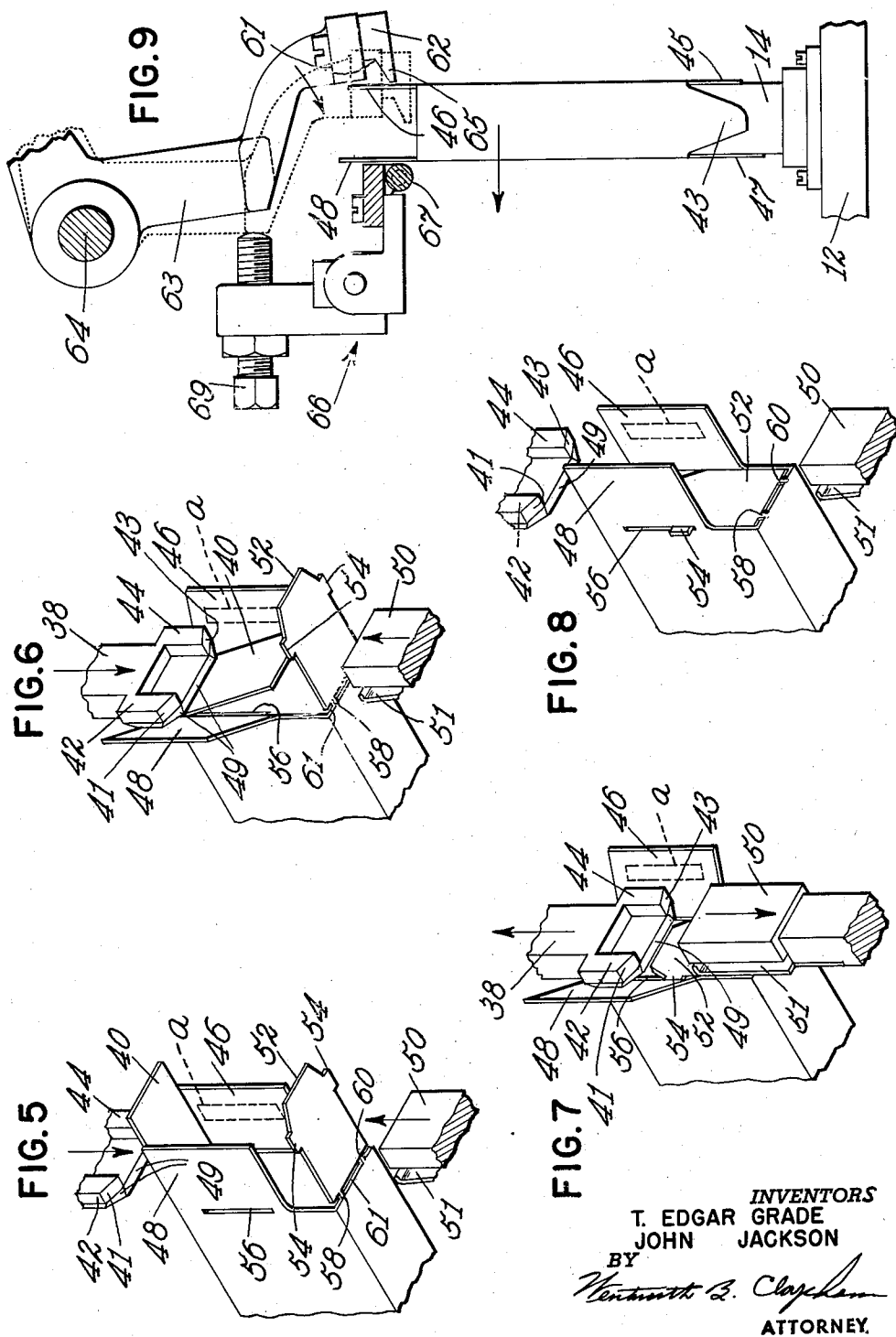
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CIGARETTE PACKAGING MACHINE

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6 Sheets-Sheet 3



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CIGARETTE PACKAGING MACHINE

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FIG. 10

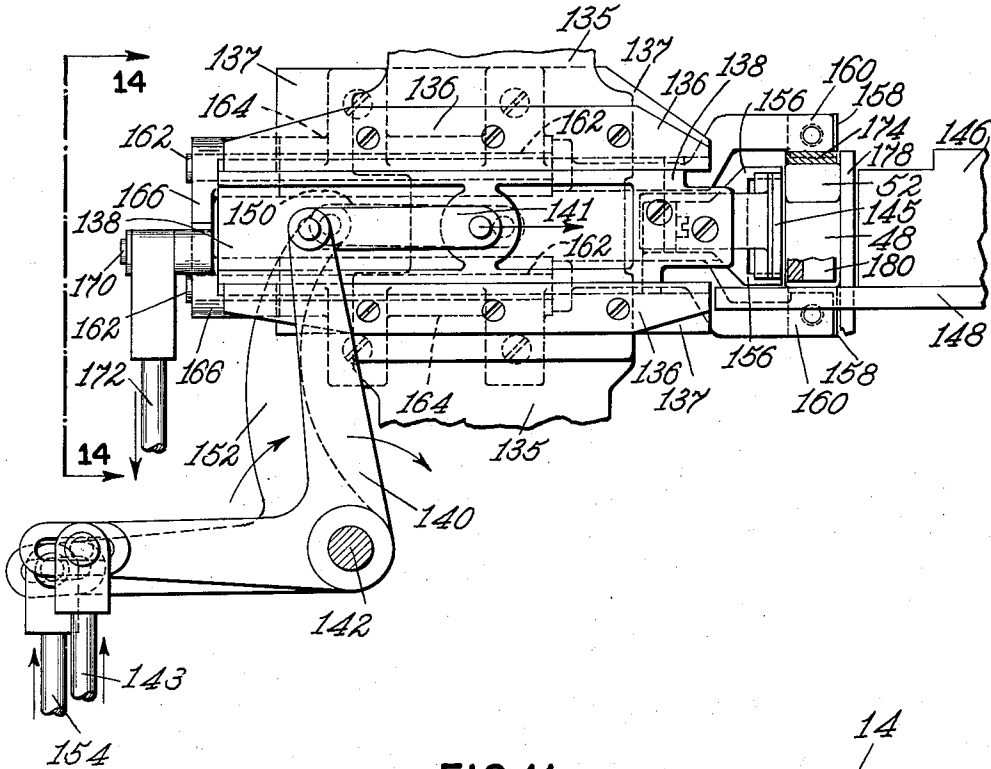
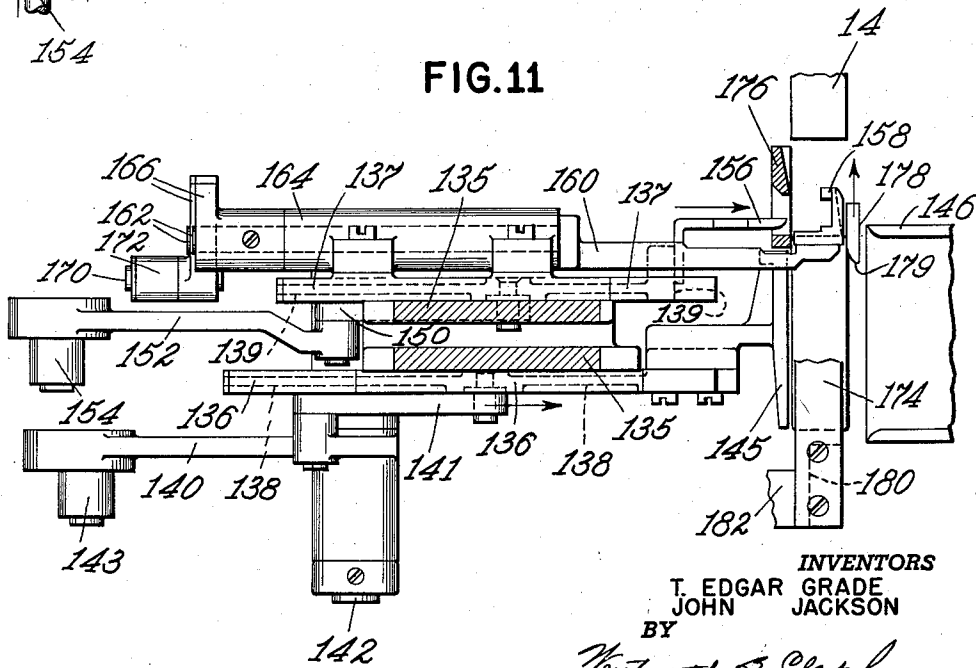


FIG. 11



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FIG. 16

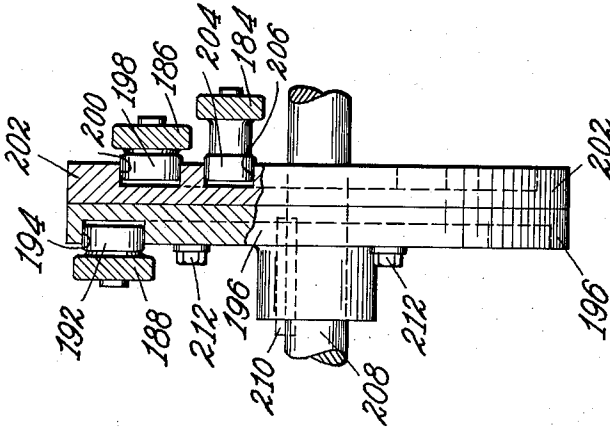
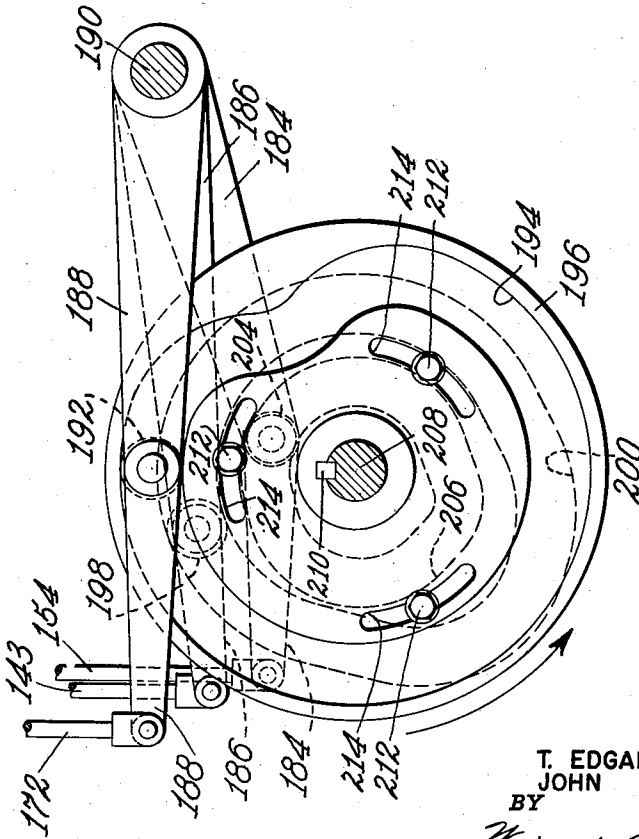


FIG. 15



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2,969,631

CIGARETTE PACKAGING MACHINE

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Filed Mar. 9, 1959, Ser. No. 797,947

20 Claims. (Cl. 53—192)

The invention relates to improvements in packaging machines, and more particularly to a packaging machine adapted to enclose articles; such as, cigarettes, in paperboard containers having a movable slide closure for an access opening provided at an upper corner in the top of the carton for removal of the articles and reclosing of the container.

In accordance with the present invention there is provided mechanism for forming paperboard cartons having a slide closure, about a series of traveling hollow turret-mounted mandrels. The blank from which the carton is formed is provided with an elongated minor end flap having side extensions or ears which, in the finished package, project through slits provided in the major panels at the top thereof. The ears assist in supporting the elongated minor flap for movement into and out of an access opening and closing position, and also provide means by which, by pushing the slide one way or the other, the carton may be opened or closed. The invention is characterized by the provision of novel folding and tucking means operative to spread out the major end flaps so that the minor flap having the support extensions can be moved inwardly between the spread major flaps. Means is then provided for folding the top cover flaps to form the top of the package.

Also included is a novel cutting knife, operative to sever the minor flap with the extensions from the body proper of the package, after it has been folded into proper position, so that when it is desired to open the package for removal of the articles therein the extensions on the minor flap may be utilized to slide the lid formed by the minor flap into open position, the package being closed by returning the minor flap to its original position by means of these extensions.

The invention is further characterized by the provision of novel mechanism for actuating the bottom tucker and folder units such that these units may be moved in timed relationship to prevent crushing or deforming of the bottom of the package formed.

Bronander Patent Numbers 1,875,986 and 1,926,192 and Arelt Patent Number 2,378,457 disclose suitable packaging machines which can be converted by means of the present invention to make paperboard cartons having a slide closure.

It is therefore an object of the present invention to provide wrapping mechanism having a series of moving hollow turret mounted mandrels and novel means associated therewith for wrapping paperboard carton blanks about the mandrels, including novel means for manipulating the flaps to insure proper disposition of an elongated minor slide closure flap between opposed major flaps during the wrapping operation.

It is a further object of this invention to provide mechanism for forming a cigarette package from a pre-cut paperboard blank having a movable top slide closure to provide an access opening at an upper corner of the carton, and wherein the slide closure is provided with

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side extensions enabling the user to move the slide closure to open and close the package.

An added object of the present invention is to provide in a packaging machine for forming paperboard cartons of the aforementioned type on a series of hollow turret-mounted mandrels, including novel folding and tucking means for spreading the major end flaps of the carton whereby the minor flap which forms the side closure having extensions for supporting it in operative position in the carton can be moved inwardly between the major flaps, the extensions being inserted on support apertures in each of the major flaps.

Another object of this invention is to provide in a packaging machine for forming a paperboard carton of the aforementioned type on a series of hollow, turret-mounted mandrels, comprising novel means for severing the slidable closure from the body proper of the package after it has been folded into proper position whereby the closure may be operated by a user to open and reclose the package.

It is an object of this invention to provide, in a packaging machine for forming a succession of cigarette packages on a series of hollow mandrels mounted on an endless conveyor; such as a turret, novel mechanism for forming the bottom wall of the finished package wherein the bottom folders and tucker mechanisms are moved in timed relationship to prevent crushing of the package formed.

A further object of this invention is to provide novel folder and tucker mechanisms for forming the bottom wall of a package, the tucker mechanism being provided with recesses, and operating mechanism for operating the tuckers and folders in timed relationship, with the recesses in the tuckers accommodating the free passage of the folder permitting coacting movement therebetween whereby the bottom wall of the package is formed without crushing or deformation.

Other objects and features of the invention will appear as the description of the particular physical embodiment selected to illustrate the invention progresses. In the accompanying drawings, which form a part of this specification, like characters of reference have been applied to corresponding parts throughout the several views which make up the drawings.

Figure 1 is a partial front elevation of a cigarette packaging machine embodying the present invention.

Figure 2 is a side elevation of the top tucking units and their operating mechanism.

Figure 3 is a side elevation partly in section, illustrating the slide tab severing mechanism.

Figure 4 is a sectional and elevation taken on line 4—4, Figure 3.

Figures 5, 6, 7 and 8 are isometric views illustrating the successive steps in folding the minor top flaps of the cigarette package.

Figure 9 is a side elevation view, partly in section, of the means for folding the major cover flaps.

Figure 10 is a rear elevation illustrating the bottom folder and tucker units and their operating mechanism.

Figure 11 is a plan view of the mechanism shown in Figure 10.

Figure 12 is a detailed view partly in section, of the operation of bottom folder and tucker units.

Figure 13 is a perspective view of the mechanism shown in Figure 12.

Figure 14 is a view taken along line 14—14, Figure 10.

Figure 15 is a front elevation of mechanism for operating the bottom tuckers and folder, and package stacker.

Figure 16 is a side elevation of the mechanism shown in Figure 15.

Referring to Figure 1, there is illustrated a cigarette

packaging machine designated generally 10 of the aforementioned type provided with a preferred embodiment of the invention. Machine 10 includes a vertically-mounted rotatable packaging turret 12 which is driven intermittently by any suitable power source (not shown) in synchronism with the working elements of the various folding devices at the working stations to be described in detail hereinbelow.

Turret 12 is provided with a number of symmetrically spaced hollow mandrels or arbors 14 which conform generally to the shape and size required for the package to be formed. With each of the mandrels 14 is associated an upper clamping arm 16 and lower clamping and folding unit 18.

In the structure illustrated, there are twelve working stations on turret 12. These are designated for convenience by Roman numerals corresponding to the hours on a clock.

In the step-wise operation of the packaging machine of which the present invention forms a part, while an empty mandrel 14 is indexed from station XII, the package ejecting station, toward station III, a suitable length of foil wrap F is formed about mandrel 14 and held in place thereabout by upper clamp arm 16, in a manner similar to that described in the aforementioned Gwinn Patent 1,885,910. As a foil-wrapped mandrel 14, is moved toward station III, a pre-cut paperboard blank B from which the outer box is to be formed, is fed transversely into the path of travel of mandrel 14 as it moves into position at station III. Blank B is provided with a securing flap 20, the outer surface of which has had suitable adhesive applied thereto and which has been folded upwardly as shown at station III, Figure 1, in the blank feeding means (not shown).

As the mandrel 14 with blank B therebeneath is moved from station III to IV, the cup or trough shaped lower clamping and folding unit 18 is moved upwardly under its associated mandrel 14, bending blank B against the sides of mandrel 14 into a general U-shape along scored lines between the front and side panels of blank B.

At station IV, blank B is wrapped about mandrel 14 in a generally tubular or sleeve-like configuration. To permit blank B to be folded about mandrel 14, upper clamp arm 16 is moved temporarily out of position adjacent mandrel 14. As clamping arm 16 is moved out of position adjacent mandrel 14, connecting rod 24 actuates lever 26, moving finger 28 into position adjacent the top of mandrel 14 maintaining the foil wrap F about mandrel 14 until blank B has been folded thereabout. Finger 28 is provided with an extension 30 which is operative to partially fold rear panel 22 of blank B into position against the top of mandrel 14 along a score line between the side and rear panels of blank B. Side clamps 32 and 34 are then actuated by shaft 35 and its associated linkages and are moved into clamping position against the sides of mandrel 14 maintaining blank B thereagainst. It will be understood that clamp member 32, in moving into position against the side of mandrel 14, insures that securing flap 20 is positioned against the top of mandrel 14. (See Figure 1.) A rear panel folding unit 36 secured to and moving with side clamp 34 completes the folding of rear panel of blank B into position against the top of mandrel 14 and overlapping securing flap 20. Side clamps 32 and 34 and panel folding unit 36 and their operating mechanisms may be similar in operation and construction to those disclosed in Arelt Patent No. 2,344,666 and further disclosure thereof is omitted in the interest of brevity. As a mandrel 14 with blank B wrapped thereabout moves from station IV to station V, upper clamp arm 16 is moved back to its clamping position against the top of mandrel 14, maintaining blank B in place about mandrel 14 and ensuring adhering of the rear panel 22 to securing flap 20.

At station V, the tucking and folding operations for forming the top of the package are accomplished. As

mandrel 14 is moved into position at station V with blank B wrapped and secured thereabout, top tucker unit 38 is actuated by mechanism to be described in detail hereinbelow and moves inwardly to engage and tuck end or minor top flap 40 of blank B downwardly against the end of mandrel 14, about a score line (not shown). Top tucker unit 38 is provided with two side extensions 42 and 44 having cam surfaces 41 and 43 which operate to spread side or major cover flaps 46 and 48 of blank B while tucking top flap 40 into position adjacent mandrel 14. (See Figure 6.) Bottom tucker unit 50 is then actuated by mechanism to be described in detail hereinbelow to tuck closure flap 52 into position against the end of mandrel 14, overlaying flap 40. Flap 52 is detachably secured to blank B. In the blank B shown it is attached at two points. 58 and 60, along cut line 61, and is folded thereabout by unit 50. Flap 52 is provided with ears or extensions 54 which are to be positioned in guide slots or slits 56 provided in the front and rear panels. Flap 52 thus forms the slide closure for the package and flap 40 supports the sliding movement of closure flap 52 in slits 56.

The spreading of cover flaps 46 and 48 by cam surfaces 43 and 41 respectively is operative to hold cover flaps 46 and 48 out of the range of operation of tucker unit 50 in folding flap 52 into position on flap 40, thereby preventing ears 54 from being crushed against the top edges of cover flaps 46 and 48 and facilitating the entry of ears 54 into slots 56.

Further, tucker unit 38 is provided with lower cam surfaces 49 which facilitate folding down of flap 40 and folding out of cover flaps 46 and 48, preventing any crushing or damage to these carton members.

Top cover flap 46 is then folded into position against the top of mandrel 14, overlaying flaps 40 and 54, by folder unit 62 actuated by a lever 63 fulcrumed on a shaft 64. Lever 63 is actuated by a suitable mechanism (not shown); such as, a cam and follower. The top of the package is completed as mandrel 14 is moved from station V to station VI. Top cover flap 48 is folded into position against the top of mandrel 14, overlapping top cover flap 46 by being moved past stationary folder unit 66. (See Figure 9.)

Referring to Figure 2, top and bottom tucker units 38 and 50 are operated by a cam 68 mounted on a shaft 70, driven from the main drive of the machine (not shown). Cam 68 is provided with a cam track 72 which engages a cam roller 74 mounted on a lever 76 fulcrumed on a shaft 78. The other end of lever 76 is pivotally connected to a connecting rod 80. The other end of connecting rod 80 is pivotally secured to the lower end of lever 82, the other end of which is secured to one end of shaft 84 rotatably mounted in a portion of the main machine frame 83. A second lever 86 is secured at its upper end to the other end of shaft 84 and is rotatable therewith. The free end of lever 86 is pivotally secured to the lower portion of block 88 to which lower tucker unit 50 is secured as shown in Figure 2. Another lever 90 is also pivotally attached at its lower end to the upper portion of block 88. The upper end of lever 90 in turn is secured to one end of a second shaft 92 rotatably supported in frame 83. Lever 94 is secured at one end to the other end of shaft 92 and is rotatable therewith. The upper end of lever 94 is freely pivotally secured to the lower end of a link member 96 while the upper end of link 96 is pivotally secured to one end of a lever 98 fulcrumed on shaft 100 secured in frame 83. The free end of lever 98 is pivotally secured to the lower portion of block 102 to which top tucker unit 38 is secured. Another lever 104 is pivotally secured at one end in the upper portion of block 100 and at its other end on shaft 105 secured to frame member 83. In operation, as mandrel 14 is moved into position at station V, lever 76 is pivoted about shaft 78 by the action of cam roller 74 travelling in cam track 72. The

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pivoting of lever 76 moves connecting rod 80 in the direction of arrow C in Figure 2. Thus connecting rod 80 pivots lever 82 and shaft 34 in a clock-wise direction, as viewed in Figure 2. This movement of shaft 84 operates to pivot lever 86 secured thereto in the direction of arrow D, Figure 2, moving block 88 and bottom tucker unit 38 from their non-operative position illustrated in full in Figure 2 upwardly and outwardly toward operative tucking position. The movement of block 88, in turn, operates to pivot lever 90 and shaft 92 in the direction of arrow D also. The rotation of shaft 92 thus pivots lever 94 in a clock-wise direction as viewed in Figure 2. This movement of lever 94, it will be understood, moves link 96 upwardly, thus pivoting lever 98 about shaft 100 in the direction of arrow E in Figure 2. This movement of lever 98 operates to move block 102 and top tucker unit 50 from their non-operative position illustrated in full in Figure 2, downwardly toward operative tucking position. It will be understood that members 104 and 90 are included for the purpose of insuring generally parallel movement of tucker units 38 and 50 to and from operative position.

As cam roller 74 continues its travel in cam track 72, the movement of connecting rod 80 is reversed by lever 76, thereby reversing the movement of the operating mechanisms for tucker units 38 and 50, moving tucker units 38 and 50 from operative tucking position shown in dotted lines in Figure 2 to non-operative position illustrated in full lines in Figure 2 to await the next successive mandrel 14 with a blank B wrapped thereabout.

Referring to Figures 5, 6, 7 and 8, it will be seen that tucker unit 50 is provided with a spring member 51 adjacent the blank engaging portion thereof. Spring member 51 ensures a positive folding of closure flap 52 into position on flap 40 and compensates for any variance in position of blank B about mandrel 14 or any play in the operating mechanism of tucker unit 50.

Referring to Figures 1 and 9, stationary folder unit 66 is provided with a roller member 67 adjacent the path of travel of mandrel 14. Roller 67 is provided to ensure that top cover flap 48 will be properly folded into overlapping position on flap 46 to which has been applied a suitable adhesive area *a*, as shown in Figures 5-8. Folder unit 62 is provided with a suitably recessed portion 61 (Figure 9) and extending folder portion 65 which is operative to fold cover flap 46 into position, overlying flaps 40 and 54, without disturbing adhesive area *a*. In addition stationary folder unit 66 is further provided with an adjustable set screw 69 which limits the length of travel of folder unit 62 as it moves into position to fold down cover flap 46.

In the embodiment of the invention illustrated, and as shown in Figure 3 at station VI, flap 52 is completely severed from blank B to provide a freely movable slide closure for the package formed. This is accomplished preferably by means of a knife 106 mounted on a block 108. Block 108 is secured to one end of a reciprocating plunger 110. The other end of plunger 110 is fixed to a carriage 112 slidably mounted for reciprocating motion on spaced rails 114 secured to the main machine frame (not shown).

It will be understood that flap 52 may be severed from blank B at any suitable station and by any suitable severing means or, if desired, flap 52 can remain connected to blank B and severed by the eventual user of the completed carton.

To actuate carriage 112 for movement along rails 114, carriage 112 is pivotally connected by stud shaft 116 to the lower end of link 118. The other end of link 118 is pivotally connected to the lower end of a generally V-shaped lever 120. The upper end of lever 120 is pivotally mounted on a shaft 122 secured in a portion of the main machine frame. To pivot lever 120 about shaft 122, a link 124 is pivotally connected at

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one end to lever 120 adjacent the mid-point thereof. The other end of link 124 is pivotally secured to one end of an actuating lever 126, the other end of which is fixed to and rotates with shaft 128, driven from the main drive of the machine (not shown).

In operation, as a mandrel 14 is moved into position at station VI, lever 126 is located in a clockwise direction, as viewed in Figure 3, by shaft 128 from the position shown in phantom toward the position illustrated in full lines. As lever 126 is so rotated, link 124, lever 120 and link 118 are moved by their connections toward the right as viewed in Figure 3. This has the effect of sliding carriage 112 toward the right, thereby moving plunger 110, block 108 and knife 106 from a dwell position at the rear of turret 12, into the open end of mandrel 14. As shaft 128 continues to rotate lever 126, knife 106 which has now been moved entirely through mandrel 14 severs points 58 and 60 which connect it to a side panel of blank B and thereby completely frees flap 52 from blank B. A ledger plate 130 is secured to a suitable bracket 132 on the frame of the machine to provide a resisting force for knife 106, ensuring a clean severing of flap 52. In addition, block 108, moving against ledger plate 130 also, provides pressure against cover flaps 46 and 48, ensuring complete adhesion therebetween and is likewise operative to square the end of the formed carton.

As shaft 128 continues to rotate, lever 126 is rotated back toward the position shown in broken lines in Figure 3. The continued rotation of lever 126 operates through the connections described to reverse the movement of carriage 112 thereby returning it to the position shown in broken lines in Figure 3 and withdrawing plunger 110, block 108 and knife 106 from within mandrel 14 to await the next successive mandrel to be delivered to station VI.

At station VII, a second plunger 129 mounted on bracket support 134 on carriage 112, is movable with plunger 110 into a mandrel 14 indexed to station VII. This second plunger 129 is provided with a presser block 131 which again applies pressure against cover flaps 46 and 48, further ensuring complete adhesion therebetween and a rectangular cross-section of the formed carton to prevent jamming or binding of closure flap 52 during operation thereof. In addition, in the event that the severed end of flap 52 has been pushed outwardly from the end of the formed carton by knife 106 at station VI, block 131 moving against a second ledger plate 133 carried by bracket 132 at station VII is operative to urge flap 52 back into position in the end of the formed carton.

Likewise, at station V, another plunger 125 is mounted on a bracket (not shown) which is similar in construction and operation to bracket support 134, and which extends from station VI to station V. Plunger 125 is thus movable with plunger 110 into a mandrel 14 at station V. Plunger 125 is provided with a presser block 127 which, in moving into mandrel 14 against the foil-wrapped end thereof, is operative as a back-up plate for top tucker units 38 and 50 and, further, block 127 ensures that the foil wrapper is maintained in wrapped position at the end of mandrel 14 during the top tucking operations. In addition, block 127 is operative to align the sides of the formed carton to ensure a freely slidable closure flap 52.

When the wrapped mandrel 14 advances on turret 12, to station IX, filler materials M are moved into the hollow mandrel 14 by suitable means (not shown), but which may be similar in design and construction to the inserting means disclosed in those patents referred to hereinabove. The materials illustrated are cigarettes, but other materials; such as cigars, confectionery, pharmaceuticals, pencils, crayons and the like are also suited to this type of packaging. Mandrel 14 with material M therein is then indexed into position at the ejection station XII. At this station, it will be understood, the carton is filled but open at the end adjacent turret 12.

Referring to Figures 10, 11, 12, 13 and 14 the mecha-

nism for closing the open tubular end of the package consists of tucker and folder mechanisms supported by a pedestal 135 secured to the main machine frame (not shown). To the latter are mounted two pairs of guide bars 136 and 137. Bars 136 support a slidable guide plate 138 while bars 137 support a slidable guide plate 139. Guide plate 138 is reciprocated by a bell crank lever 140 connected to said plate by a link 141. Lever 140 is loosely mounted on a shaft 142 and is operated by a connecting rod 143.

Guide plate 138 is secured to lower plate 145 which is employed to push the packages delivered from mandrel 14 at station XII, the ejecting station, of turret 12, into the delivery chute which consists of a pair of side guide rails 146 and a bottom guide plate 148 (Figure 1), suitably supported on the machine frame by a bracket (not shown).

Guide plate 139, through a link 140, is reciprocated by a bell crank lever 152 also loosely mounted on shaft 142, lever 152 being operated by a connecting rod 154. Upon the reciprocating guide plate 139 is mounted a generally U-shaped folder plate 156 having operative spaced folding extensions 157 employed for the purpose of folding over generally U-shaped flaps 45 of the package after the initial tucks are completed by a pair of generally L-shaped swinging tuckers 158.

Each of the tuckers 158 is adjustably attached to one of a pair of extension bars 160 which forms part of an oscillating shaft 162, each of which is supported by a bearing bracket 164 adjustably fastened to pedestal 135. To the end of each shaft 162 is adjustably attached a gear sector 166, both sectors meshing with each other when their centers coincide with the centers of shafts 162. The gear sectors 166 may be adjusted a small distance radially toward each other on their shafts after the latter have been adjusted away from each other a corresponding distance.

Following such adjustment the radial distance from the shaft centers to the gear teeth at the middle portions of the segments will be slightly less than the radial distance to the gear teeth at the ends of the segments, because the gear sectors are not concentric with the shaft centers but have a greater pitch diameter, but this will not interfere with their meshing. The meshing teeth will have minimum clearance at the beginning and end of each working stroke even if the tuckers 158 and shaft 162 have been adjusted as described, thus giving the tuckers a definite location and assuring a sharp fold, as all free play is eliminated at these portions of the working stroke. One of the sectors 166 is provided with a lug 168 which carries a stud 170 to which is pivoted a connecting rod 172 which imparts oscillating motion to the gear sectors 245.

The packages are completed with the exception of the top end folds, on mandrels or arbors on the turret of a cigarette packaging machine such as described in the above mentioned Patent 1,926,192 to W. B. Bronander. The completed packages with the top end still open are ejected from their associated mandrel 14 at the ejecting station, station XII, of the turret 12 and are pushed in a horizontal position between bottom guide plate 148 and top guide plate 174 respectively, of the tucking and folding unit. A stationary and a horizontally reciprocating side guide plate 176 and 178, respectively, are provided to secure the straight entry of the package between plates 148 and 174 in the proper location for the tucking and folding operations. Plates 176 and 178 also serve the purpose of giving additional support to the top and edges of the package on which the tucking and folding mechanisms operate. Top plate 174 is fastened to an abutment 180 mounted on a suitable support 182. Abutment 180 is arranged to engage the entering end of the package when the same is properly located as described hereinbelow.

Referring to Figures 15 and 16, there is illustrated the actuating mechanism for connecting rods 143, 154 and

172. Rods 143, 154 and 172 are pivotally connected at their free ends to one end of cam levers 184, 186 and 188 respectively. The free ends of cam levers 184, 186 and 188 are loosely mounted in common on shaft 190 suitably secured in the frame of the machine. Cam lever 188 is provided adjacent its mid-point with a freely rotatable cam roller 192, which is positioned to travel in cam track 194 of cam 196, as shown in Figure 15. Cam lever 186 is provided adjacent its mid-point with a freely rotatable cam roller 198 which is positioned to travel in cam track 200 of cam 202. Cam lever 184 is provided adjacent its mid-point with a freely rotatable cam roller 204, which is positioned to travel in a second cam track 206 in cam 202.

Cam 196 is mounted on cam shaft 208 by means of key 210 and rotates therewith in the direction of the arrow (Figure 15). Cam shaft 208 is driven by suitable drive means (not shown). Cam 202 is freely mounted on cam shaft 208 but is secured to cam 196 by means of bolts 212 and rotates therewith. Bolts 212 are positioned in arcuate apertures 214 as shown in Figure 15, thus cams 196 and 202 can be shifted on cam shaft 208 relative to each other by changing the position of bolts 212 in apertures 214. The relative displacement of cam tracks 194 and 206, on cam shaft 208 permits movement of both operating rods 172 and 154 at the same time. Thus, folder plate 156 is advanced toward the package and folds the end flap 45 into position before tuckers 158 have been moved completely out of contact with ends 41 and 43 for reasons set forth hereinbelow. It will be further understood that a shifting of cams 202 and 196 relative to each other on cam shaft 208 varies the timing of the operation of connecting rods 154 and 172 in any desired amount.

As the package is ejected from turret 12, side guide plate 178 moves in the direction towards mandrel 14, meets the package and then travels with the same, stopping in a position illustrated in Figure 10, while the package is pushed in between plates 148 and 174, until the bottom end of the package reaches the abutment 180. The bottom end of the package is still open and tuckers 158 swing inwardly as illustrated in Figure 13, and tuck flaps 41 and 43 as illustrated in Figure 13. As the tucking operation is completed and tuckers 158 are being moved in the direction of the arrows indicated in Figure 12, the folder plate 156 advances toward the package and folds the protruding end flap 45 onto the tucked ends 41 and 43 of the package.

It will be understood that folder plate 156 folds end flap 45 into position while tuckers 158 are still in contact with flaps 41 and 43 holding them in tucked position.

Flap 45 is provided with a suitable adhesive area *b* for securing the bottom of the formed carton and folder plate 156 is provided with spaced folding extensions 157 to fold flap 45 without disturbing adhesive area *b*. (See Figure 13.)

Tuckers 158 are preferably L-shaped and each is provided with operative folding ears or extensions 159 and suitably shaped recesses 161. Ears 159 operate to fold flaps 41 and 43 into tucked position and to hold them there as flap 45 is folded into overlying relationship therewith. Recesses 161 accommodate the free passage of folding extensions 157 and the corner positions 53 of flap 45.

The timed co-action between tuckers 158 and plate 156 is made possible by the particular shape of tuckers 158 and folder plate 156 whereby clearance is provided for free passage therebetween, permitting the coacting movement described hereinabove. Thus the flaps 41 and 43 are maintained in position against the bottom of the foil-wrapped pack until flap 45 has been positioned in overlying position thereagainst. This prevents "spring-back" of flaps 41 and 43 after tuckers 158 are returned to non-operative position. Such "spring-back" might

cause a crushing of the carton when folder plate 156 advances to fold end flap 45 into place.

Further, the timed relationship between tuckers 158 and folder plate 156 may be accomplished by means of separate cams 202 and 196. However, if desired, a single cam having two adjustably mounted cam tracks can be used. This timed relationship between tuckers 158 and folder plate 156 insures that flap 45 is moved into overlapping position on flaps 41 and 43.

During the return motion of folder plate 156, guide plate 178 moves again towards mandrel 14, in the direction indicated by the arrow in Figure 11 and stops when its half-rounded side edge 179 is aligned with a package guide 146. Pusher plate 145 which up to this moment served as a guide and support of the package during the final tucking and folding operation, through the action of guide plate 138 and pushes the package into the package delivery chute formed by guide rails 146 and bottom plate 148. While entering the delivery chute, end flap 47 passes under the half rounded side edge 179 of plate 178 and is smoothly folded down over the previously folded end flap 45 to complete the bottom wall of the package.

Thus there is provided a cardboard carton containing a packaged liner and packaged articles and provided with a freely movable slide closure for an access opening at an upper corner of the carton.

What we claim is:

1. In a packaging machine having a series of hollow travelling mandrels adapted to be moved stepwise to and from a plurality of operating stations including a filling station, apparatus for forming cartons thereabout, each of said cartons being formed from a blank having integrally connected front, rear and side panels, and top and bottom end flaps for forming top and bottom walls, said blank being provided with a closure flap connected to the top of one of said side panels for forming a slide closure for said carton, said apparatus comprising means for folding said blank about the girth of said mandrel, means for folding said top flaps and closure flap to form said top wall, means for severing said closure flap from said side panel whereby said carton is provided with a freely slidable closure, and means operative after a mandrel supporting a partially formed carton has been moved from said filling station for folding the bottom end flaps to form a completed carton.

2. In a packaging machine having a plurality of hollow travelling mandrels, apparatus for forming a carton about each of said mandrels, said cartons being formed from a blank having front and rear panels hingedly connected to an intermediate side panel, bottom end flaps hingedly connected to said front, rear and side panels for forming a bottom wall for said carton, said side panel having a closure flap connected to the top edge thereof along a line of separation, said closure flap having a pair of lateral operating ears, said front and rear walls each having a slot extending along the top edge thereof and adapted to receive and guide said ears, said front and rear walls having cover flaps hingedly connected thereto and dimensioned to provide an access opening at an upper corner of said carton, said apparatus comprising means for folding said blank about the girth of said foil-wrapped mandrel, a tucking device for tucking said closure flap into position against the edge of said mandrel and substantially at right angles with the longitudinal axis of said mandrel, said ears of said closure flap being inserted thereby into said guide slots of said front and rear panels, folders for folding said cover flaps over said closure flap to form a top wall of said carton, means for severing said closure flap from said side panel whereby said carton is provided with a freely slidable closure, and folding and tucking members for forming said bottom flaps of said blank into said bottom wall to complete said carton.

3. In a packaging machine having a series of hollow travelling mandrels, apparatus for forming cartons thereabout, said carton provided with a slide closure and formed from a blank having a front panel, a first side panel, a rear panel, and a second side panel, each of said panels having a bottom closure flap extending therefrom, said front and rear panels having cover flaps hingedly connected thereto, said cover flaps being dimensioned to provide an access opening for said carton, said first side panel having an elongated extension extending between said cover flaps and being connected to said first side panel by a line of separation, said extension being provided with a pair of guides extending transversely therefrom, said blank being provided with a pair of slots in the front and rear panels thereof for receiving said guides, said second side panel being provided with a top flap hingedly connected thereto for supporting said extension, said apparatus comprising means for folding said blank about the girth of said mandrel, means for tucking said top flap into position against the edge of said mandrel, means for tucking said extension into position overlying said top flap against the edge of said mandrel, said first-named tucking means being provided with devices for facilitating the insertion of said guides on said extension into their associated receiving slots in said front and rear panels, means for folding said cover flaps into position overlying said top flap and said extension to form the top wall of said carton, a knife, means mounting said knife for movement into and out of the open end of said mandrel, means for operating said knife to sever said extension from said first side panel whereby said carton is provided with a freely slidable closure having operating guides extending through said slots, means for ejecting said partially formed carton from about its associated mandrel, and folding and tucking members for forming said bottom closure flap of said blank into said bottom wall of said carton.

4. The invention as defined in claim 3 wherein said devices on said first-named tucking means include lateral extensions for spreading said cover flaps widely apart whereby said guides on said elongated extension can be inserted into their associated receiving slots without damage.

5. The invention as defined in claim 3 including a spring member, means mounting said spring member on said extension tucking means for engagement with said elongated extension whereby said spring member is operative to ensure positive tucking of said elongated extension regardless of the position of said blank on said mandrel.

6. In a cigarette packaging machine having a conveyor provided with a plurality of equidistantly-spaced hollow traveling mandrels on which cigarette packages are formed, said conveyor being adapted for indexed movement to and from a plurality of operating stations including a cigarette filling station, apparatus for forming an outer wrapper for each of said packages, said wrapper being provided with a slide closure and formed from a paperboard blank having integrally connected front, rear and side panels and top and bottom flaps for forming top and bottom walls of said wrapper, said blank being provided with a closure flap connected to the top of one of said side panels for forming a slide closure for said formed carton and the top flaps of said front and rear panels being dimensioned to provide an access opening for said wrapper, said apparatus comprising means for folding said blank about the girth of a mandrel, means for folding said top flaps and closure flap to form said top wall, means for severing said closure flap from said side panel whereby said carton is provided with a freely slidable closure and means operative after a mandrel having a wrapper partially formed thereabout has been moved away from said cigarette filling station for folding said bottom flaps of said blank to form a completed wrapper.

7. The invention as defined in claim 6 including operat-

ing ears extending laterally from said closure flap, guiding slots provided in said front and rear panels adjacent the top flaps thereof for receiving and guiding said operating ears, and means for effecting the insertion of said ears into said slots as said closure flap and top flaps are folded to form said top wall.

8. In a cigarette packaging machine having a series of traveling box shaped supports, apparatus for forming an outer wrapper for each of said packages, said wrapper provided with a slide closure and formed from a relatively stiff paperboard blank having integrally connected front, rear and side panels and top and bottom flaps for forming top and bottom walls of said wrapper, said blank being provided with a closure flap connected to the top of one of said side panels for forming said slide closure, the top flaps of said front and rear panels being dimensioned to provide an access opening for said wrapper, said closure flap having operating ears extending laterally therefrom and said front and rear panels provided with elongated apertures adjacent the top flaps thereof for receiving and guiding said operating ears, said apparatus comprising means for forming said blank about the girth of said traveling support, a tucking device for tucking said closure flap into position against the end of said support, said tucking device being operative to insert said operating ears into said guiding apertures, folders for folding said top flaps into overlying relationship on said closure flap to form the top wall of said wrapper, means for severing said closure flap from said side panel whereby said wrapper is provided with a freely slidable closure, and tucking and folding members for forming said bottom flaps of said wrapper into said bottom wall to complete said wrapper.

9. In a packaging machine having a series of moving block-shaped supports, apparatus for forming a carton about said supports, said carton being provided with a slide closure and formed from a paperboard blank having a front panel, a first side panel, a rear panel and a second side panel, each of said panels having a bottom closure flap extending therefrom, said front and rear panels having top cover flaps dimensioned to provide an access opening at one end of said carton, said first side panel having a closure flap connected thereto for forming a slide closure for said access opening of said carton, said second side panel having a top flap connected thereto for supporting said slide closure, said closure flap having operating ears extending laterally therefrom, and said front and rear panels provided with elongated apertures adjacent the cover flaps thereof for receiving and guiding said operating ears, said apparatus comprising means for forming a blank about the girth of each of said moving supports, a tucker for tucking said top support flap of said second side panel into position against the end of said support, another tucker for tucking said closure flap into overlapping relationship with said top support flap, means for folding said cover flaps into overlapping position on said closure flap to form the top wall of said carton, means for severing said closure flap from said first side panel whereby said carton is provided with a freely slidable closure, and tucking and folding members for forming said bottom flaps of said blank into the bottom wall to complete said carton.

10. The invention as defined in claim 9 wherein said first named tucker is provided with lateral extensions for bending said cover flaps outwardly to insure the entry of said ears of said closure flap into said receiving and guiding apertures.

11. The invention as defined in claim 9 wherein said means for severing said closure flap from said first side panel includes a knife, means mounting said knife for movement into and out of operating position against said closure flap and means for operating said knife to sever said flap from said first side panel.

12. The invention as defined in claim 9 wherein said last named tucking and folding members include a pair

of spaced supports, means for ejecting a partially completed carton from about its associated moving support and into position between said spaced supports, a pair of tuckers, means rotatably supporting said tuckers adjacent each side of the open end of said carton for tucking opposed bottom side closure flaps of said blank, the operative tucking portions of said tuckers being provided with recesses therein, a folder device, means mounting said folder device at the ends of said spaced supports for movement against a first bottom closure flap of said blank for folding down said first bottom closure flap over said tucks to form the inner bottom flap of said carton, operating means for operating said tuckers and said folder device in timed relationship, with the recesses in said tucker faces accommodating the free passage of the operative folding portions of said folder device therepast whereby said tucks are maintained in position adjacent the bottom of said carton as said inner bottom flap is folded into overlying position thereagainst and means for folding the second bottom closure flap of said blank into position over said inner bottom flap to form the outer bottom flaps, completing said carton.

13. The combination with a support for a package having a tubular wrapper having one end closed and foldable flaps projecting from its other end, of a pair of tuckers, means rotatably supporting said tuckers adjacent each side of said projecting tubular portion for tucking said tubular wrapper portion, said operative tucking portions of said tuckers being provided with recessed sections, a folder movable against a portion of said projecting wrapper for folding down said portion in overlying relationship with said tucks and operating means for operating said tuckers and said folder in timed relationship, with the recesses in said tucker faces accommodating the free passage of said folder therepast permitting co-acting movement therebetween whereby said tucks are maintained in tucked position as said portion of wrapper engaged by said folder is folded into overlying position against said tucks.

14. The invention as defined in claim 13 wherein said operating means includes cam tracks, means connecting one of said cam tracks to said tuckers for controlling the rotation thereof, means connecting another of said cam tracks to said folder for controlling the movement thereof, and means mounting said cam tracks in displaced relationship relative to each other for effecting the timed movement of said tuckers and folder.

15. The invention as defined in claim 14 wherein said cam track mounting means is adapted to vary the relative displacement between said cam tracks whereby the co-acting movement of said tuckers and folder is selectively controlled.

16. The combination with a support for a package having a wrapper enclosing its girth and having a tubular portion projecting from one end thereof, of a pair of substantially L-shaped tuckers, means rotatably supporting said tuckers at the end of said support and adjacent each side of said projecting tubular portion for tucking said tubular wrapper portion, a folder, means mounting said folder for movement against a portion of said projecting wrapper for folding down said portion in overlying relationship with said tucks, said folder provided with operative spaced folding extensions, and operating means for operating said tuckers and said folder in timed relationship with the recessed portions of said L-shaped tuckers accommodating the free passage of the folding extensions of said folder, permitting co-acting movement therebetween, whereby said tucks are maintained in tucked position as said portion of wrapper engaged by said folder is folded into overlying position upon said tucks, said operating means including cam tracks, means connecting one of said cam tracks to said tuckers for controlling the rotation thereof, means connecting another of said cam tracks to said folder to control the movement thereof and means mounting said cam tracks in displaced relationship

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relative to each other for effecting the timed movement of said tuckers and folder.

17. The invention as defined in claim 16 wherein said folder is adapted for reciprocating movement in a plane substantially at right angles with the longitudinal axis of said package and said tuckers are rotated in a plane transverse to the plane of folder movement.

18. The invention as defined in claim 16 wherein said cam track mounting means is adapted to vary the relative displacement between said cam tracks whereby the amount of co-acting movement of said tuckers and folder is selectively controlled.

19. The invention as defined in claim 9 wherein said tucker for tucking said closure flap includes a resilient

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member, means mounting said resilient member on said closure flap tucker unit for engagement with said closure flap whereby said resilient member is operative to ensure positive folding of said closure flap regardless of the position of said blank on said support.

20. The invention as defined in claim 9 including means for effecting the rectangular alignment of the sides of said formed carton adjacent the top thereof whereby the free sliding movement of said closure flap is ensured.

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