May 26, 1953 R. J. FAHEY 2,639,648

CARTON SETUP MACHINE

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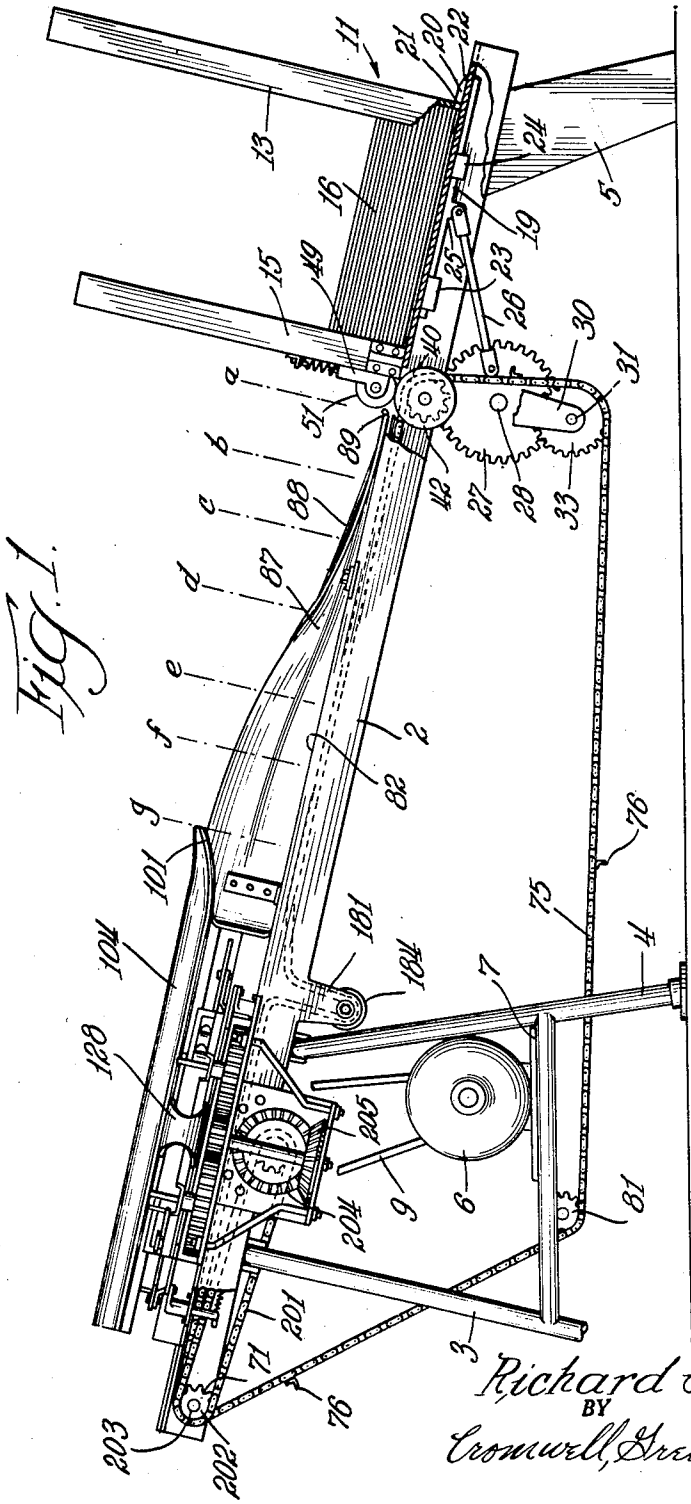


Fig. 1.

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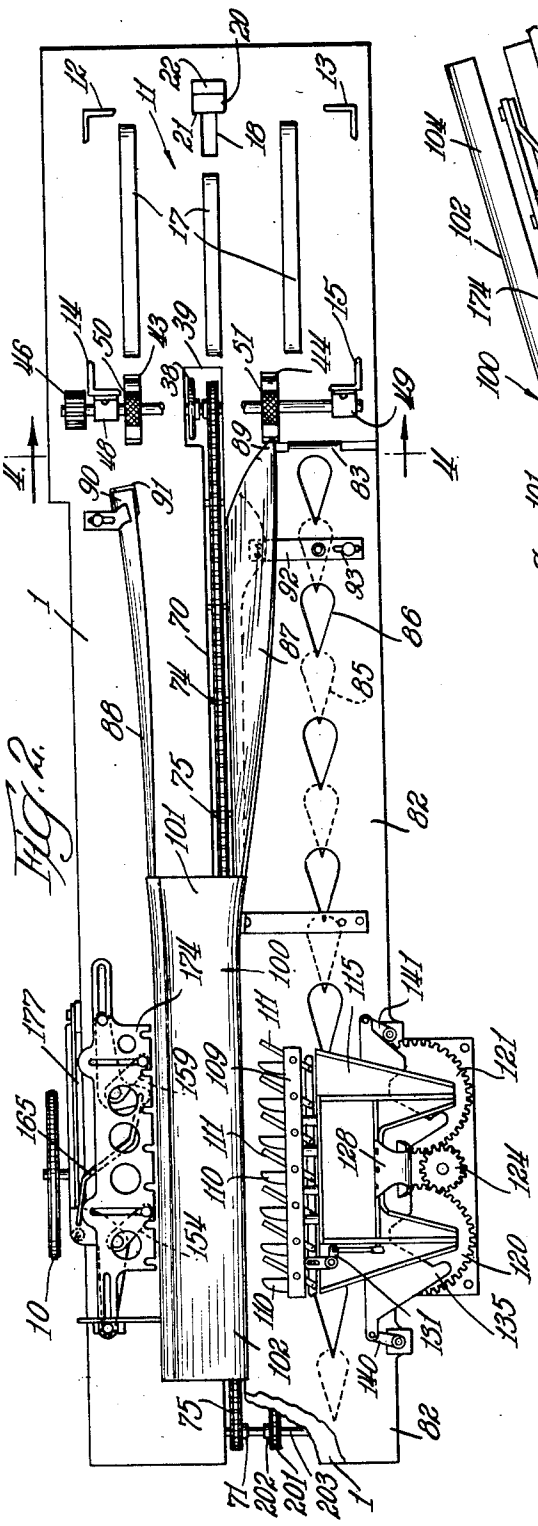


FIG. 2.

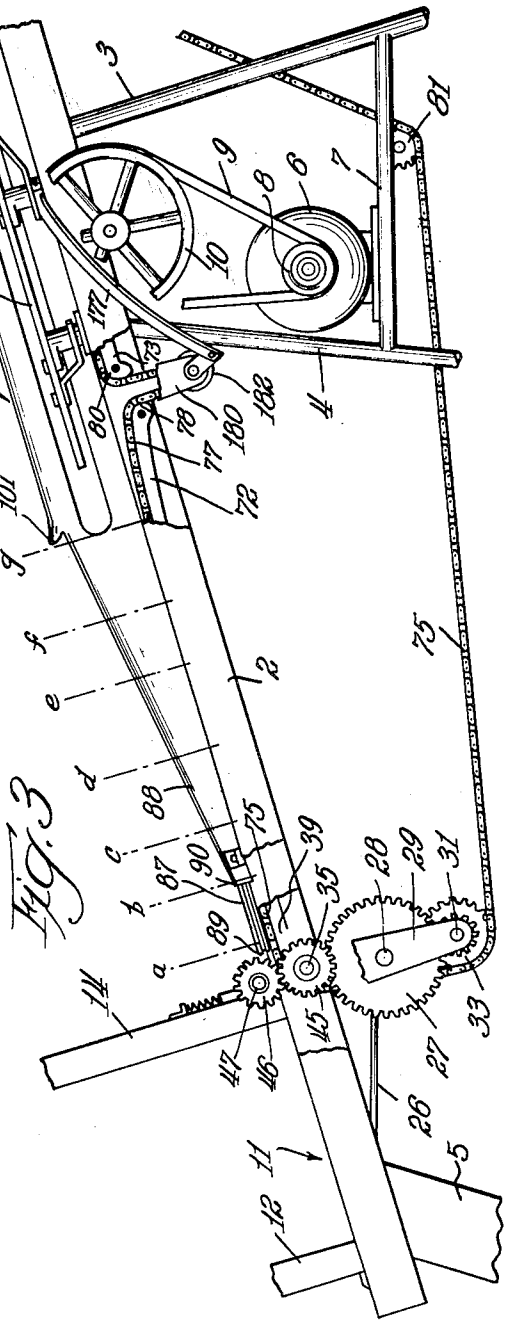


FIG. 3.

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CARTON SETUP MACHINE

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Fig. 4.

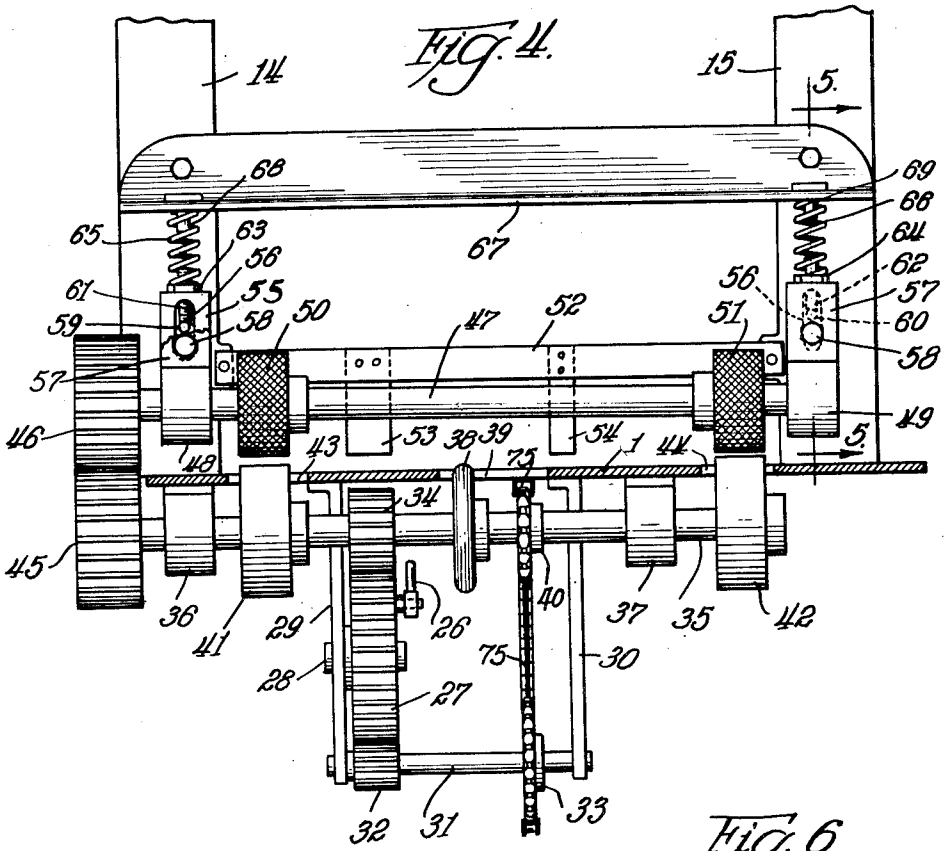


Fig. 5

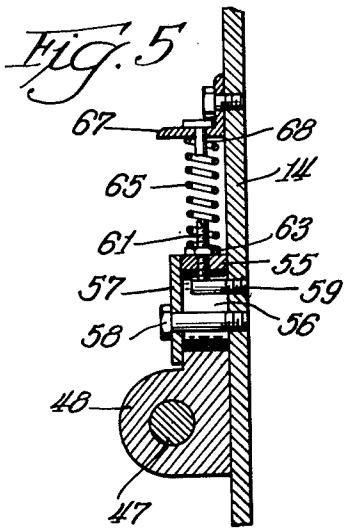
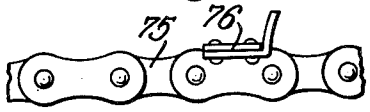


Fig. 6.



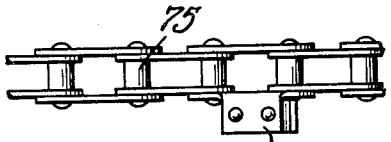


Fig. 7.

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Fig. 8.

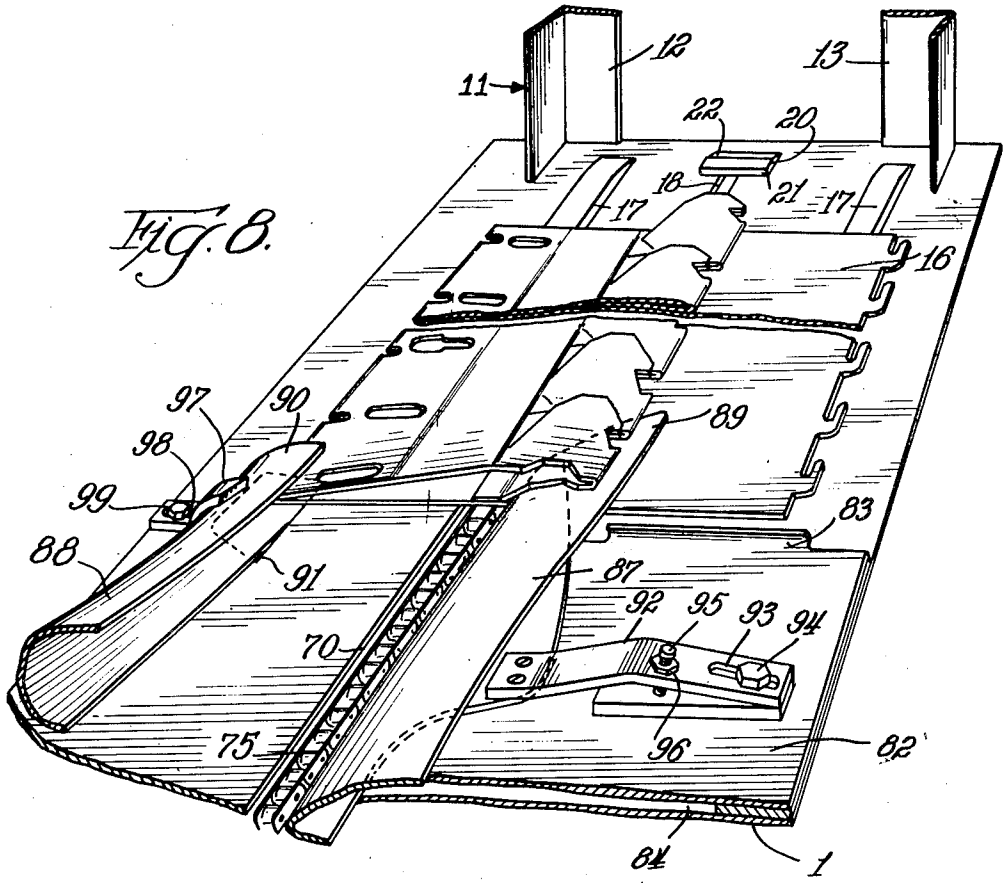


Fig. 9.

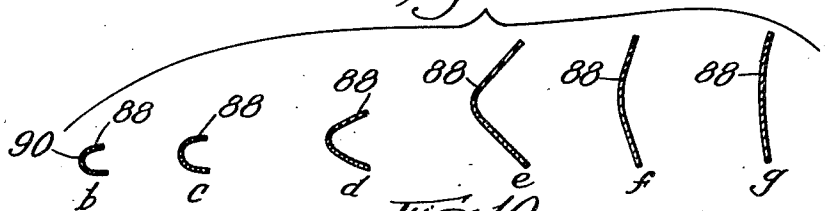
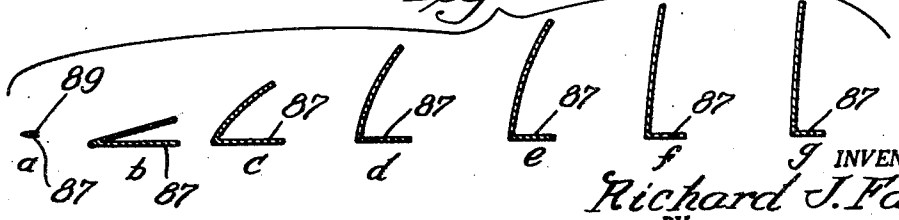


Fig. 10.



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Fig. 11

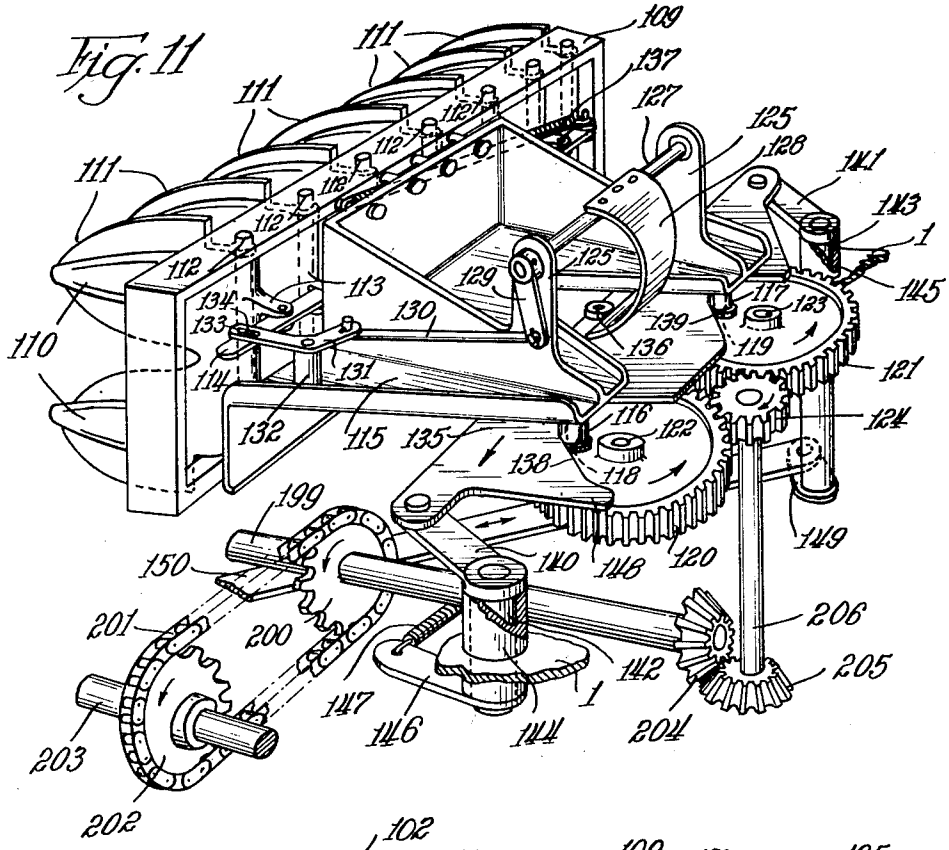
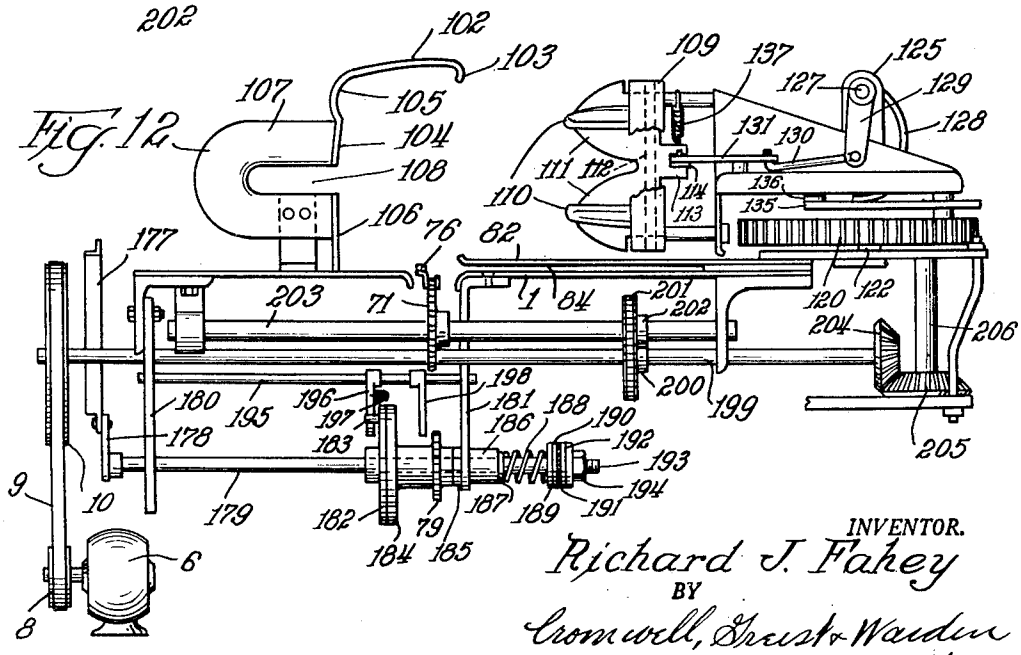


Fig. 12



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Fig. 13

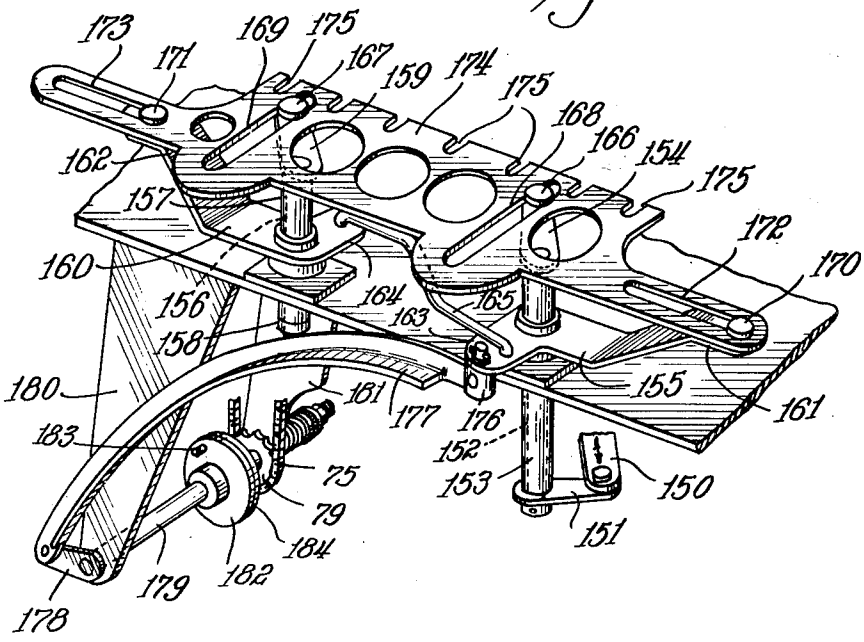
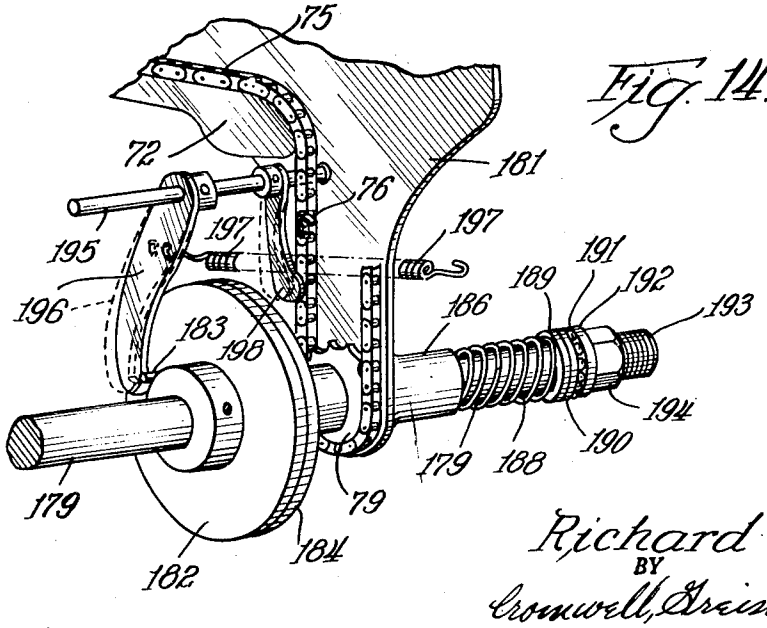


Fig. 14



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Fig. 15.

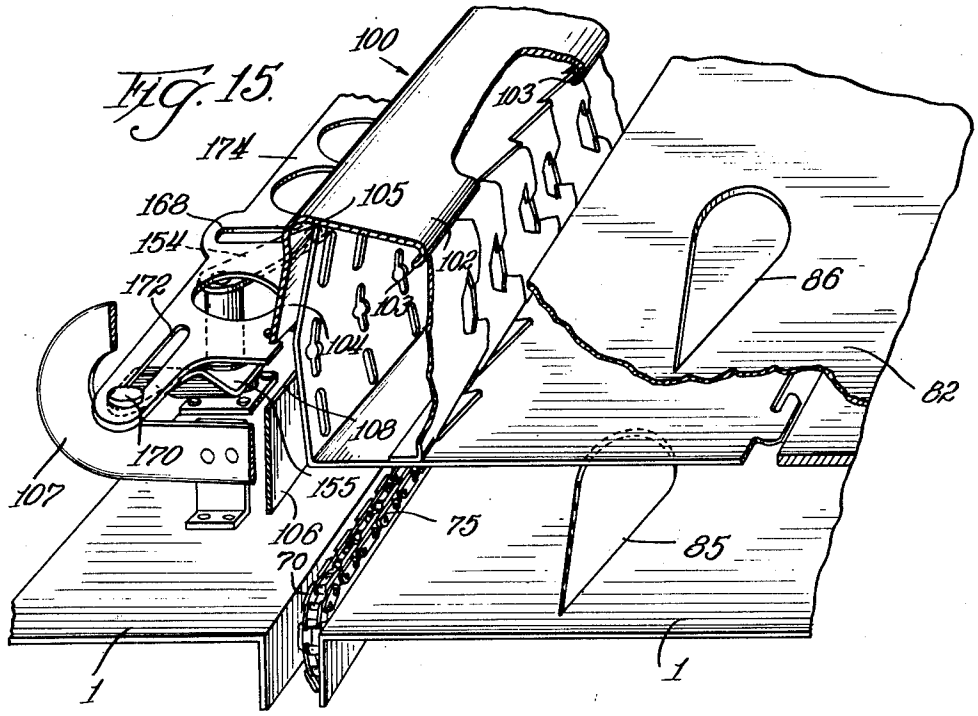
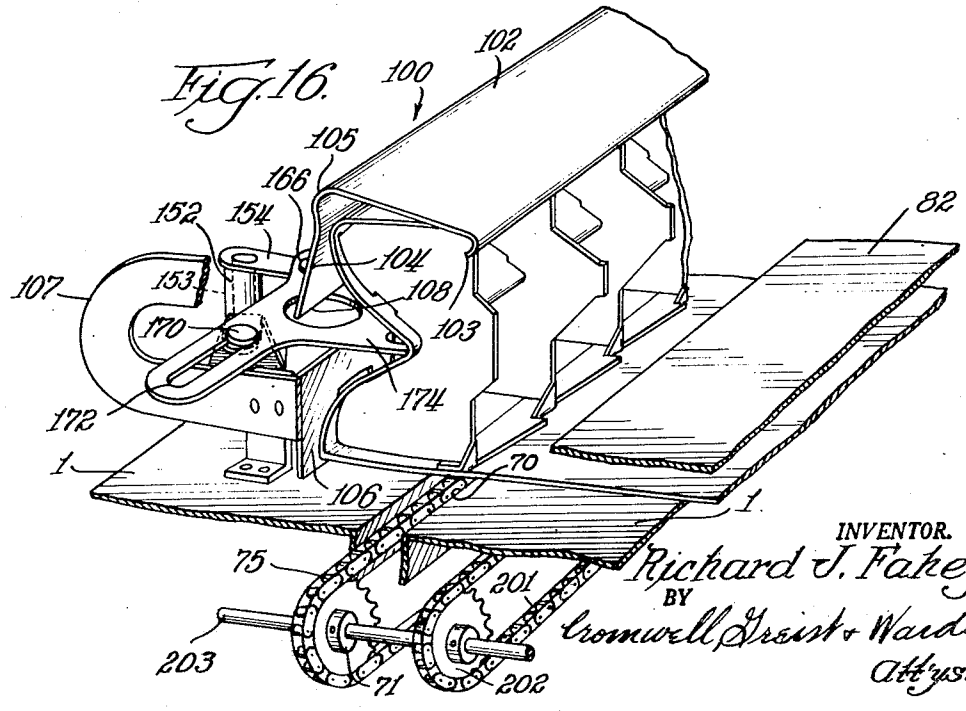


Fig. 16.



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UNITED STATES PATENT OFFICE

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CARTON SETUP MACHINE

Richard J. Fahey, Evanston, Ill., assignor to Shellmar Products Corporation, Chicago, Ill., a corporation of Delaware

Application September 28, 1946, Serial No. 699,950

32 Claims. (Cl. 93—37)

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This invention pertains to automatic set-up machines for collapsed egg cartons, particularly cartons of the type disclosed in U. S. Reissue Patent No. 18,922 to Felix Troyk, a type which has met with considerable commercial success.

Automatic carton set-up machines for cartons of the type indicated above have been heretofore provided, however, they are ordinarily heavy and cumbersome and include parts which are expensive to fabricate. Moreover, they are in many cases subject to frequent delays in operation and at best operate at relatively low speed.

It is an object of this invention to improve on prior automatic carton set-up devices by providing a machine which is light in weight and easily handled; which is composed of relatively inexpensive parts; which passes the carton through a straight line course of advance in the set-up operation, during all of which the carton is held and supported against displacement apt to cause the carton to become mangled or broken; which has a tendency to discharge any carton that for any reason has not properly set-up during passage through the machine; and which is capable of operation at extremely high speeds.

A further and more specific object of the invention is the provision of a machine utilizing chute means for forming the carton body and orbitally traveling elements operating transversely of said chute means to cause engagement of certain transverse partitions and the bottom portion of a carton of the type identified above.

Still other and further objects and advantages will appear from the following description and from the drawings in which:

Fig. 1 is a side elevation of the complete machine as it appears when viewed from that side thereof on which a transversely operating partition depressing head is mounted;

Fig. 2 is a top plan view of the machine;

Fig. 3 is a side elevation of the machine viewed from a side opposite that shown in Fig. 1;

Fig. 4 is a fragmentary cross sectional view taken substantially on the line 4—4 of Fig. 2; illustrating certain details of a carton advancing and preliminary set-up mechanism included in the machine;

Fig. 5 is a fragmentary cross sectional view taken substantially along the line 5—5 of Fig. 4;

Fig. 6 is a fragmentary side elevation of a portion of a carton advancing chain and one of the several carton engaging lugs associated therewith;

Fig. 7 is a plan view of the showing of Fig. 6;

Fig. 8 is a diagrammatic perspective view looking in the direction of the supply magazine end of the machine, with the carton advancing mechanism of Fig. 4 removed to better show the initial progress of a carton out of the magazine and into a body forming chute or channel;

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Fig. 9 represents a plurality of diagrammatic cross sectional views, taken along several lines indicated by letters in Figs. 1 and 3, indicating the gradual corresponding change of cross sectional conformation of one of the carton body forming chutes longitudinally of the machine, as viewed from the discharge end of the machine;

Fig. 10 represents diagrammatic cross sectional views of another of the carton forming chutes at points corresponding to the lettered lines of Fig. 9;

Fig. 11 is a fragmentary perspective view of certain operating parts of the machine, showing in particular the mechanism for operating the orbitally traveling head for erecting the transverse partitions of the cartons;

Fig. 12 is a fragmentary view taken from the discharge end of the machine, further illustrating details of the mechanism of Fig. 11;

Fig. 13 is a perspective view of the blade element for erecting and engaging the carton bottom and integral longitudinal partition with the erected transverse partitions, also illustrating elements associated with the blade for its operation;

Fig. 14 is a fragmentary perspective view of a clutch mechanism by which one of the movements required of the blade element of Fig. 13 is imparted thereto in timed sequence to the carton advancing means and transverse partition erecting head;

Fig. 15 is a fragmentary perspective, partially in section, showing the blade element of Fig. 13 in its most retracted position in its relation to a carton, prior to operation thereon by the blade element and the mechanism of Fig. 11, said mechanism not appearing in this figure; and

Fig. 16 is a fragmentary perspective showing the blade of Fig. 13 in its most extended position in relation to a carton after rotative erection of the transverse partitions thereof by the mechanism of Fig. 11.

The Troyk type carton, which is seen on the drawings in Figs. 8, 15 and 16, is of unitary paperboard construction and consists of a cover panel having on its front margin a locking strip provided with integral locking hooks; rear wall panel; a relatively wide panel, forming a longitudinal partition and bottom in the set-up carton; a front wall panel having a plurality of substantially triangular extensions (see Fig. 16); a transverse partition panel comprising a plurality of individually cut-out transverse partitions; and an attaching or glue strip which is adhesively attached to the inner side of the rear wall panel. The several panels are foldable with

respect to each other along transverse fold or score lines.

In the collapsed condition of the carton shown in Fig. 8, the component parts thereof are so disposed as to present a single paperboard thickness at the cover portion, a double thickness at the side opposite the cover and triple thickness medially of the carton.

To set-up the carton from this knocked-down shape, the front and rear wall panels are pressed into generally upright position, the transverse partitions are swung on integral hinges from coplanar knock-down position to spaced parellel position, and the longitudinal partition and bottom forming panel brought from an outwardly extending to an inwardly extending position to interlock with the ends of the transverse partitions. To this end, the latter are medially bifurcated and have opposed hooks formed thereon, and the longitudinal partitions have openings to receive the hooks and lower medial portions of each of the transverse partitions.

Referring to the drawings, the reference numeral 1 indicates the flat bed of the machine which is positioned in a frame 2 supported upon pairs of opposed fore, intermediate and back legs 3, 4, 5 respectively, which are of different length. An electric motor 6 is positioned on a shelf 7 supported by legs 3 and 4, its pulley 8 carrying V-belt 9. Belt 9 is in driving engagement with a driven pulley 10 journalled on frame 2 to impart the required movements to the machine, as hereinafter described.

At one end of the machine bed 1, which will hereinafter be referred to as the "rearward" part of the apparatus, is a hopper or magazine 11 formed by four upwardly directed angle iron corner posts fastened to the machine bed. Numerals 12, 13 indicate the rearward pair of posts and numerals 14, 15 indicate the forward pair thereof. Corner posts 12, 13, 14, 15 are spaced both longitudinally and transversely of the bed 1 to accommodate and retain at the corners a stack of collapsed cartons of the type mentioned hereinabove, typically indicated in the drawings by number 16. The cartons are preferably placed in the magazine with their folded transverse partitions extending rearwardly of the machine, as shown in Fig. 8. Parallel friction reducing strips 17 are positioned on bed 1, within the lateral confines of magazine 11, to facilitate feed of cartons 16 therefrom.

Machine bed 1 has a longitudinally extending center slot 18 cut therethrough within the confines of the magazine to permit extension therethrough of the integral drive bar 19 of a reciprocating dog 20 (see Fig. 1). Dog 20 has an abrupt vertical fore-edge 21 for engagement with the sides of each bottommost carton in the stack to advance them in the machine, in the forward movement of the dog, and has a rearwardly slanted top and rear portion 22, whereby to avoid tearing the lowermost carton in the stack in its rearward movement. It will be noted by reference to Fig. 8 that dog 20 engages each lowermost carton at the triple thickness medial portion thereof. The top of the dog is below the top surface of this portion, and is thus engageable only with the lowermost carton on the forward stroke and incapable of advancing for set-up more than one carton at a time. Below bed 1, drive bar 19 is carried in fore and aft guides 23, 24, respectively. Medially of the guides the bar carries a connecting member 25, to which is attached one end of a pitman 26, the other end of pitman 26 being eccentrically pivoted to a rotatable gear 27, particularly shown in Figs. 1 and 4. Rotation of gear in a manner to be described results in reciprocation of the pitman and dog 20 to effect initial forward advance of the lowermost carton from magazine 11.

Referring now to Fig. 4, it will be noted that gear 27 is mounted on a stub shaft 28, carried on a bracket 29 depending from bed 1. A similar bracket 30 depends from the bed in transversely opposed, parallel relation to bracket 29 and a lower shaft 31 mounted transversely between said brackets serves as a support for a pinion 32 which drives gear 27. Shaft 31 also carries a chain sprocket 33 in spaced relation to pinion 32, the function of which will be later described.

Above gear 27 and meshed therewith to be driven thereby, is a gear 34 which is fixedly attached to a shaft 35, the latter being borne in spaced opposed bearings 36, 37 on the machine bed. A carton body biasing or elevating element, in the form of a wheel 38, is mounted substantially medially of shaft 35 to extend upwardly thru an opening 39 in said machine bed. At one side of wheel 38 and in vertical alignment with sprocket 33, is a further chain sprocket 40, said sprockets serving to guide certain chain operated feed means, as will be more fully set forth hereinafter. Feed rollers, designated 41, 42, respectively, are also borne by shaft 35 in spaced relation to one another. These rollers extend upwardly above the level of machine bed 1 through openings 43, 44, respectively, provided in such bed. In order to drive the upper feed rollers 50 and 51 positively, a gear 45 is mounted fixedly on one end of shaft 35 in driving engagement with another gear 46 which is fixedly attached to a shaft 47 borne by spaced adjustable bearing blocks 48, 49 which are mounted on the respective magazine corner posts 14, 15. Also fixedly mounted on shaft 47 are a pair of knurled, upper carton feed rollers 50, 51 which are in respective vertical alignment with lower carton feed rollers 41, 42, coacting with the latter in advancing the lowermost carton from the magazine, as will be described. The drive of shaft 35 from gear 27 results in driving shaft 47 at equal speed whereby positive feeding action is imparted to rollers 50, 41 and 51, 42.

A transverse plate 52 is secured to corner posts 14, 15 at a point rearwardly of and slightly above shaft 47 and carton stops 53, 54, depend therefrom to a point near bed 1, the purpose of said stops being to restrict the outlet of magazine 11 and prevent ejection of more than a single carton at a time.

Bearing blocks 48, 49 are intended to have limited upward sliding displacement on corner posts 14, 15 and for that purpose are provided with integral upwardly extending slide portions 55, in which are formed vertically extending slots 56. Antifriction cover plates 57, secured by studs 58 to the posts 14, 15 coact with said posts in defining shielded slideways for the slide portions 55 which permit limited vertical movement of bearings 48, 49. In order to determine and adjust the lowermost position of the bearings, pins 59, 60 are mounted on the corner posts within slots 56 as particularly shown in Figs. 4 and 5. Slide portions 55 are threaded to receive adjustable set screws 61, 62 which abut pins 59, 60, these set screws 61, 62, being locked in desired position by lock nuts 63, 64. Screws 61, 62 are of such a length as to serve as centering means for one end

of the coil compression springs 65, 66, and said springs at their other end abut the flange of an angle iron support 67 mounted transversely of corner posts 14, 15. Said support carries downwardly extending lugs 68, 69 on which the adjacent ends of the coil springs are centered to hold them against displacement.

As mentioned hereinabove a carton of the Troyk type, when folded, presents along its one edge a double thickness of paperboard and along its cover it presents but a single thickness, usually about .023 inch per sheet. Since it is important that both upper and lower pairs of carton feed rollers 50, 51 and 41, 42 respectively, have firm frictional engagement with the carton during the advance thereof, it has been found desirable to bias the position of shafts 35, 47 at an angle. Thus feed rollers 41, 50 are enabled to contact the carton along a part thereof having a double thickness with the same compressive force as feed rollers 42, 51 contacting the carton along the cover, where there is but a single thickness of material. The necessarily biased relation of the opposed shafts and affixed rollers can be effected to some degree by the inherent spring loaded, floating character of bearings 48, 49, but best results have been obtained by actually biasing shafts 35, 47 mechanically so that rollers 41, 50 have somewhat more than twice the gap present between rollers 42, 51. Specifically, best results have been obtained by permitting a normal opening of about .0125 inch between rollers 41, 50 as contrasted to a normal opening of .005 inch between rollers 42, 51. This adjustment is readily effected by manipulation of set screws 61, 62

As particularly shown in Fig. 2, a central slot 70 extends longitudinally of machine bed 1 throughout the length of such bed, forwardly of wheel opening 39, with which such slot 70 merges. A pair of longitudinally spaced, aligned chain supports or guides, are disposed medially of slot 70, in alignment with the above mentioned sprocket 40 and with a drive sprocket 71 at the forward end of the machine, the rearmost of said guides being designated 72, and the forward designated 73. (See Fig. 3.) Said guides are mounted on side spacers 74 and are positioned below the level of machine bed 1 a distance to permit the roller chain 75 referred to above to travel below machine bed 1, out of contact with cartons thereon. Chain 75 carries lugs 76, at regularly spaced intervals, which project through slot 70 into engagement with the rear of a folded carton to advance the same along the bed.

As shown on the drawings, guides 72, 73 are spaced apart longitudinally at a point about medially of the machine. At its forwardmost end, guide 72 has a downward sloping chain support surface 77, terminating in an abruptly rounded end as at 78, whereby to permit chain carried lugs 76 to first gradually withdraw from pushing contact with cartons advanced thereby, then, after disengagement from the cartons, to drop abruptly. Chain 75 then passes around an idler sprocket 79 on a shaft 179, shown in Figs. 13 and 14, thence returns into engagement with the carton as each lug 76 whips around the relatively abruptly curved inner end 80 of guide 73. As shown in Figs. 1 and 3, after passing around forward drive sprocket 71, chain 75 passes around an idler sprocket 81, thence travels substantially horizontally around sprocket 33 and upwardly over sprocket 40. Chain 75 is driven at sprocket 71 in the manner hereinafter described, and in its movement transmits power through sprockets 33 and 40 to the mechanism shown in Fig. 4, to drive the feed shafts 35, 47.

As shown in Figs. 2, 12, 15 and 16, a carton cover restraining plate 82 having an upturned fore-lip 83 extends throughout the length of the machine, at one side thereof, from a position forwardly of the carton feed rollers 50, 41 and 51, 42 to the discharge end of the machine Plate 82 is disposed at a slight elevation above machine bed 1 and parallel thereto, providing a continuous longitudinal pocket 84, which holds down the covers of cartons in their progress through the machine. If desired, as shown in Fig. 1, both the machine bed 1 and the plate 82 may be provided with openings 85, 86, respectively, preferably in offset relation, to permit easy removal from pocket 84 of accumulated dust, dirt, carton pieces, etc.

Referring particularly to Figs. 1, 2 and 3 it will be noted that the carton forming chute or channel of the machine employs a pair of carton body shaping chute members, that which operates on the transverse carton partition panel being designated 87 and that which operates upon the bottom and longitudinal partition portion of the cartons being designated 88. As also shown in Figs. 1 and 8, chute member 87 has a pointed end 89 which extends adjacent the carton feed rollers 42, 51, at about the level of cover retaining plate 82. Accordingly, when a carton is fed out through the feed rollers, the slight upward bend imparted to it by biasing roller 38 tends to open up a space between the carton cover and the folded transverse partitions into which the pointed end 89 enters. Thus the carton body shaping operation is initiated.

Chute point 89, in preferred form, extends closer to the carton feed rollers than does the corresponding end 90 of chute 88, so that the carton will have progressed forwardly a distance in contact with chute 87 before entering chute 88. The lower wing of the U-shaped open end 90 of chute 88 is at about the level of machine bed 1 and to accomplish this object the bed is recessed as at 91. (See Fig. 8.) The positioning of chutes 87, 88 is critical, hence adjustment means, particularly shown in Fig. 8, are provided for adjustment of both the vertical and horizontal positions of such chutes. The adjustment means for chute 87 comprises a bowed strap 92, having its one end rigidly attached to an outwardly curved lower portion of chute 87 and having a longitudinal slot 93 formed adjacent its outer downwardly bent end. A stud or bolt 94 connects strap 92 to the machine bed, through plate 82. Hence lateral adjustment of the chute may be effected. Medially of its length, strap 92 has an adjustment screw 95 threaded therein, which abuts a thrust member on plate 82. A lock nut 96 permits locking of screw 95 in desired position to adjust the vertical disposition of chute 87.

The positioning of chute 88 is not as critical to the extent of the other chute, since at its end 90 it is relatively open. Primarily to provide lateral adjustment of chute 88 an adjustment strap 97 is fastened thereto and such strap has a longitudinally extending slot 98 formed therein. A stud bolt 99 passes through slot 98 to fasten strap 97 to machine bed 1. Sideways adjustment of chute 88 is thus permitted by varying the relation of the last named strap and bolt.

The chutes 87, 88 converge with respect to one another (see Fig. 2) as they progress away from magazine 11 and their respective sectional conformations change progressively. The change in angularity of chute 87 from its end point 89, to a

position of greatest approach to the vertical is shown by the series of cross sections shown in Fig. 10, taken at successive points *a* through *g* of Figs. 1 and 3. The corresponding change in conformation of chute 88 from its end 90 is generally indicated by the corresponding series of cross sections shown in Fig. 9.

Chutes 87, 88 merge, about medially of the distance between the forward end of the magazine and the other end of the machine, with a further, generally rectangular chute, indicated generally by numeral 100. The latter, adjacent the point of merger of chutes 87, 88 therewith, has an upturned, longitudinally directed, carton guiding forelip 101 integral with the chute top 102, and said chute top 102 has a longitudinally extending, inwardly bent or re-entrant side lip 103 adapted, as shown in Fig. 15, to engage and restrain the triangular projections on the top of the carton front wall. Chute 100 is otherwise open along its side adjacent said lip 103 to permit entry thereinto of the transverse partition depressing or erecting head 109, to be described. As will be seen from Figs. 12, 15 and 16, chute 100 has an upper sidewall 104 opposite lip 103 which has a slightly outwardly curved, convex portion 105 at its connection to top 102, opposite the in-turned side lip 103. The corresponding lower side portion of chute 100 consists of a lower wall 106 held in spaced relation to upper wall 104 by a U-shaped support member 107 (see Fig. 12). This provides a longitudinally directed slot 108 between walls 104, 106 in which the carton bottom and longitudinal partion inserting blade 174, hereinafter described, may perform its function, the lip 103 meanwhile guiding and restraining the carton body at its opposite top side.

The transverse partition depressing and erecting head 109, shown in Fig. 11, is disposed on the side of the carton opposite blade 174, and comprises a generally rectangular base carrying two rows of spaced, fixed partition depressing fingers, each indicated by the numeral 110. Adjacent each opposed pair of fingers is mounted a partially rotatable, bifurcated leaf member 111 pivoted by a transverse shaft 112 on the head 109. Each leaf member 111 has a rearwardly extending actuating foot 113 formed thereon and in turn pivoted to a connecting bar 114, the latter being adapted for movement longitudinally of head 109 and in such movement imparting partial rotation to all leaf members 111 in the series.

Head 109 is rigidly attached to an orbitally movable carrier 115 which has a pair of depending cylindrical sleeves 116, 117 in pivotal engagement with the respective eccentric studs 118, 119 on spaced gears 120, 121. Gears 120, 121 rotate on stub shafts 122, 123 respectively suitably mounted in frame 2, and are driven in a common counter-clockwise direction by a single drive pinion 124, located between and meshing with said gears. Hence upon rotation of said pinion and gears, carrier 115 and head 109 are caused to move in an orbital path, accompanied by movement of the leaf members 111 and certain other parts on the head and carrier, now to be described.

A pair of opposed and upwardly directed extensions 125 on carrier 115 serve to support a transverse shaft 127 which at a medial point thereon fixedly carries an arcuate actuating arm 128. Shaft 127 also carries a fixed arm 129 externally of extension 125 which is pivotally connected by link 130 to one arm of a bell crank 131. Crank 131 is medially pivoted at 132 to carrier 115 and the other arm thereof has a short slot 134 formed therein in which a stud 133 on connecting bar 114 engages. Actuation of said bar is effected through the agency of a reciprocable cam plate 135 below carrier 115 having a cam roller 136 thereon which contacts the end of actuating arm 128. This in turn imparts movement to said arm and its interconnected, above-described parts including bar 114, closing leaf members 111 during reciprocation of plate 135. Said leaf members are closed against the resistance of a coil tension spring 137 which tends to return leaves 111 to normally open position.

Plate 135 has a pair of identical cam surfaces 138, 139, formed on the rear side thereof which are maintained in constant contact with the aforesaid eccentric sleeves 116, 117 in the reciprocation of the plate and pivoted at each end of plate 135 are a pair of identical arms 140, 141. These arms are fixedly mounted on shafts 142, 143 respectively which extend below machine bed 1 being carried in sleeve bearings 144, 145. Below the level of machine bed 1 shaft 142 is secured to an arm 146, to the end of which is attached a coil tension spring 147, the other end of said spring being attached to the machine frame 2. The purpose of spring 147 is to urge plate 135 in a direction to maintain cam surfaces 138, 139 in constant contact with eccentric sleeves 116, 117. Furthermore, to insure shock-free return of plate 135 under the tension of spring 147, said plate is provided with a cam extension surface 148 merged into the cam surface 138 which reduces "slap" during return.

Mounted on the other depending shaft 143, below the level of machine bed 1, is an arm or lever 149, to which is pivotally attached a diagonally extending rod 150. As shown in Figs. 11 and 13, rod 150 transmits movement in a diagonally forward direction to an arm 151 positioned in the same plane as and parallel to arm 149. Arm 151 is fixedly attached to an upwardly extending rock shaft 152 which is pivotally mounted on the machine bed by a sleeve bearing 153. Another arm 154 is attached to the upper end of rock shaft 152, above the level of machine bed 1.

Sleeve 153 also functions as a pivotal support, above the level of machine bed 1, for a bell crank member 155 which operates in tandem with a second similar bell crank 160 on a shaft 156. Like shaft 152, shaft 156 has a bearing paralleling shaft 152 within a sleeve 157, being retained within such sleeve by a collar 158. An arm 159 similar to arm 154 is fixedly connected to shaft 156 in coplanar and generally parallel relation to arm 154. The second bell crank 160 is secured to sleeve 157 in coplanar relation to crank 155. The long arms 161, 162, respectively of said cranks are aligned with one another but extend in opposite directions and the short arms 163, 164 of the bell cranks are pivotally connected by a diagonal link 165 whereby the cranks 155, 160 have equal and opposite rotative movement when one thereof is oscillated. Arms 154, 159 have identical headed retaining guides 166, 167 on their extremities, the necks of which approximate the width of parallel slots 168, 169 in a blade 174, through which they extend. Bell crank arms 161, 162 also have headed retaining guides 170, 171 similar to guides 166, 167, the necks of such guides approximating the width of spaced, aligned slots 172, 173 in blade 174. The circular openings shown in blade 174, and to which no numerals have been applied, are formed therein

only for the purpose of reducing weight of such blade. Along its inner edge blade 174 has a series of identical notches 175 formed therein to bridge the transverse partitions of the carton in engaging the bottom thereof in the manner shown in Figs. 15 and 16.

Again referring to Fig. 13, a swingable coupling element 176 is pivoted to bell crank arm 163 and also to a pin on one end of an arcuate actuating arm 177. The other end of arm 177 is attached to a rocker arm 178 attached to a shaft 179, which is rotatably mounted parallel to machine bed 1 in parallel brackets 180, 181. Accordingly rotation of shaft 179 results in reciprocation of actuating arm 177, accompanied by oscillation of bell cranks 155, 160 in opposite directions. Such rotation is accomplished through a one revolution frictional slip clutch, in the following manner.

A steel clutch plate 182 having an outwardly extending trip lug 183 mounted on its exterior surface is pinned to shaft 179 and is engageable on its opposite surface in frictional contact with a fibre clutch disk 184. Disk 184 and sprocket 79 are preferably integrally connected and are mounted on shaft 179 for relative rotation thereon, slipping relative to plate 182 when the same is restrained from rotation and at other times driving said plate. As particularly shown in Fig. 12, sprocket 79 bears axially against the smooth flat side of an anti-friction thrust washer 185, which in turn abuts the inner side of bracket 181. On the opposite side of bracket 181 is a boss 186 provided with an annular shoulder 187 against which one end of a coil compression spring 188 abuts. The other end of spring 188 abuts supporting collar 189 formed of soft metal, and the latter is in face abutment with the hardened race 190 of a ball bearing thrust assembly 191 including race 192. Shaft 179 is threaded at its end, as at 193, to receive a spring tension adjusting nut 194. Hence the degree of slip-driving frictional engagement of the clutch plate 182 and disk 184 is accurately adjusted.

As shown in Figs. 12 and 14, a rock shaft 195 is mounted between brackets 180, 181 rearwardly of and above rotatable shaft 179. A hook 196 is mounted on shaft 195 in alignment with clutch lug 183, being kept in restraining relation to such lug under the tension of a helical spring 197, one end of which is attached to said hook and the other end of which is attached to a suitable point on the machine body. Also fixedly mounted on rock shaft 195, in spaced relation to hook 196 and adjacent the side edge of chain 75, is a detent lever 198 which is contacted by the forward edge of each chain carried carton advancing lug 76 in its path of travel. When contacted by lug 76 lever 198 is swung backwardly, carrying with it shaft 195 and hook 196, against the tension of spring 197, thus temporarily disengaging the hook 196 from lug 183, as shown by the dotted lines in Fig. 14, and permitting rotation of clutch plate 182 and shaft 179 by disk 184.

As previously described, motor 6 transmits motion through belt 9 to pulley 10. As shown in Fig. 12, pulley 10 is attached for rotation to a transverse shaft 199 journalled in the machine frame 2. Approximately intermediate the length of shaft 199 a sprocket 200 is secured, rotation of which transmits movement through chain 201 to a sprocket 202 fixedly mounted on a parallel rotatable shaft 203 at the forepart of the machine. Shaft 203 also carries sprocket 71 which actuates carton advancing chain 75.

As shown in Figs. 11 and 12, a vertically extending bevel gear 204 is secured on the end of shaft 199 opposite pulley 10, which is meshed with a similar gear 205 mounted on rotatable vertical shaft 206. Drive pinion 124 is secured to the other end of shaft 206, so that the partition erecting head and parts associated therewith obtain their drive in this manner.

Rotative movement imparted shaft 199 by motor 6, through the belt and pulley assembly shown, is transmitted through chain 201 and its associated sprocket to shaft 203, rotating sprocket 71 to drive chain 75. Chain 75 passes around adjustable idler 81 and drives sprockets 33 and 40 (see Fig. 4), the movement of these last named sprockets being transmitted through the gear train comprising pinion 32 and gears 27, 34 to drive pitman 26 and reciprocate dog 20.

In operation with a stack of cartons disposed in magazine 11 dog 20 shifts forwardly until its abrupt upright edge 21 comes in contact with the rear end of the bottommost carton at a position behind the triple thickness folded transverse partitions and feeds the same forward in the direction of opposed carton feed rollers 41, 50 and 42, 51. Once the carton has begun to pass through the relatively narrow opening between machine bed 1 and stop elements 53, 54 its forward end becomes engaged between the aforementioned rollers. The speed of said rollers is such that the carton is accelerated and in consequence is withdrawn from contact with dog 20, which thereupon returns to original position.

Coincident with its entry between the bight of the feed rollers mentioned above, the carton is medially biased upwardly by roller 38, which biasing tends to elevate the end transverse partitions slightly from their flat, generally parallel position with respect to the carton cover. This permits insertion of the end 89 of chute 87 into the space between the partitions and cover, as particularly shown in Fig. 8.

As will be noted from Fig. 1, the arcuate or U-shaped end portion of chute 87, forwardly of chute point 89, extends in the rearward direction to an extent such that the operation of elevating the transverse partition above the carton top begins prior to entry of the folded bottom and longitudinal partition portion in chute 88. However, once the last named carton portion has entered chute 88 the carton area adjacent the line of bottom fold tends to engage the internal apex of the angled chute 88. Thus, continuous, opposed abutment surfaces are provided to receive the oppositely directed forces placed upon the carton as the same is forced between the converging chutes 87, 88. As chutes 87, 88 converge, their surfaces approach the vertical as shown in Figs. 9 and 10, and impart a rectangular outline to the carton body, other than the cover. When the carton has been advanced slightly to extend forwardly of the feed rollers, the carton cover follows the plane surface of machine bed 1 between the bed and plate 82 and continues in the pocket 84 throughout its travel through the machine. If for any reason the carton cover is slightly elevated as it emerges from magazine 11, it is guided into recess 84 by the upturned forward lip 83 of plate 82.

As soon as the rearward edge of the carton has passed out of contact with rollers 41, 50 and 42, 51 the carton is engaged and forwarded by a lug 76 carried by the chain 75, said lug coming into contact with the carton rear immediately below the still collapsed, rearwardly extending

transverse partitions. So propelled, the carton advances into the forward portion 100 of the chute, in which the operation of erecting and locking the carton partitions is performed.

The timing of the parts is such that at about the time lug 76 begins its withdrawing action over inclined surface 77 on guide 72, to pass around sprocket 79, the partition depressing head 109 and associated mechanism particularly shown in Fig. 11 begins its inward stroke into the opening below chute side restraining lip 103. At this moment the fixed fingers 110 are in register with the carton transverse partitions, the points thereof entering the carton interior immediately forwardly of each partition and its hinge line, i. e., on the side of the partition toward which it is to be swung to erected position. Substantially coincident with this engagement of fixed fingers 110 as fixed abutments for the partitions the movable leaves 111 begin to close, this being occasioned by engagement of arcuate actuating arm 128 by cam roller 136, shown in Fig. 11. Each leaf swings toward its associate abutment finger 110, forcing a partition toward parallel, side by side engagement with that finger.

The orbital rotation and inward movement of the partition set-up head 109 tends to progress the carton longitudinally of chute 100. During said rotation of the set-up head sleeves 116, 117 contact cam surfaces 138, 139 giving longitudinal forward movement to plate 135, which movement is transmitted through arms 141 and 149 to the diagonally extending arm 150. The movement of arm 150 is in turn transmitted to arm 151 (see Fig. 13) and its associated parts including arm 154, which action starts the bottom erecting blade 174 on the other side of the carton in motion in a direction longitudinally of the machine. The bell cranks 155, 160 assure line motion of the blade paralleling that of the carton by keeping its forward, notched edge parallel to the line of carton travel.

When the set-up head reaches approximately its point of maximum inward stroke the carton transverse partitions will have been forced into parallel relation between fingers 110 and leaves 111 of the head. This is occasioned by the fact that head 109 has a somewhat greater transverse or inward component in its orbital travel than the inward throw of plate 135, due in turn to the design of cams 138, 139 along which eccentric sleeves 116, 117 roll. Hence cam roller 136 engages arcuate actuating arm 128 to swing the latter counterclockwise at approximately the point of maximum inward travel of head 109. As a result, leaves 111 are actuated to clamp the carton partitions against fingers 110. At this time the lug 76 which advanced the carton into position opposite the head 109 will have advanced downward toward sprocket 79 sufficiently to engage arm 198 (see Fig. 14), forcing it rearwardly and disengaging hook 196 from its restraining relation to clutch lug 183 on plate 182. The steel and fibre disks 182, 184, respectively, of the clutch have constant, face to face, frictional, slip clutch engagement whereby disk 184 will turn without undue drag when plate 182 is restrained by hook 196, but will rotate plate 182 when hook 196 is disengaged. During the release period, when hook 196 has been disengaged, lug 76 will pass lever 198 and the hook will return to its normal position under tension of spring 197, reengaging lug 183 after one revolution of the latter and preventing further movement of shaft 179 until again disengaged in manner set forth above.

The single revolution of shaft 179 in the aforesaid release period is converted from arm 178 to a rapid forward and return reciprocatory movement of arcuate arm 177, which is transmitted to bell crank 155; and the latter, with its associated parts including the tandem-connected bell crank 160, gives a snap movement to blade 174 in an inward direction normal to the path of the carton, then a return movement outwardly. It will thus be seen that during a part of its operative cycle blade 174 is traveling in both a longitudinal and transverse direction. Maximum inward stroke of the partition set-up head 109 and the bottom and longitudinal partition erecting blade 174 occur at approximately the same time, at which moment the transverse carton partitions are at right angles to the carton bottom, firmly held between fixed fingers 110 and the forwardly extended leaves 111 on the head 109, as described above. The inner face edge of opposed blade 174 thus medially contacts the portion of the carton forming the bottom and longitudinal partition thereof, forcing it into secure locking engagement with the hooks on the transverse partitions, substantially as shown in Fig. 16.

Once the transverse partitions are in locking engagement with the bottom and longitudinal partition forming portion of the carton, the carton is progressed further forward under the impetus of the rotating head 109 and the longitudinally advancing, but outwardly retracting, blade 174. During this short advance, lug 76 on chain 75 passes around sprocket 79 and advances over the end 80 of guide 73 to re-engage the rear edge of the now set-up carton, whereupon it pushes the carton continuously until the latter is discharged from the machine, as chain 75 withdraws over the periphery of sprocket 71.

From the foregoing it is apparent that I have provided a carton set-up machine of materially improved speed and effectiveness in operation. The cartons are moved in a single, relatively short, straight line path from the magazine 11, through chutes 87, 88 wherein initial erection to box-like outline is performed and into the chute 100 in which the partitions of the carton are erected and operatively engaged. Likelihood of snagging, clogging and destruction of the articles is reduced to a minimum by this arrangement. The orbital, composite, longitudinal and lateral movements of the head 109 and partition engaging plate 174 contribute substantially to overall smoothness and speed of operation, the cartons being practically unhalted in their longitudinal travel during operation by these components and being forwarded thereby during the portion of the cycle when the lugs 76 are disengaged from the carton.

The machine is rendered unfailing in its operation by reason of the positive control of the carton throughout the travel therethrough, i. e. by the positive engagement by the magazine feed dog 20, the magazine feed rollers 50, 41 and 51, 42 and the advancing chain lugs 76. The cover restraining pocket 84, the forming chutes 87, 88 or 100, and in particular the side restraining lip 103 of the latter, all act similarly to engage and control the carton continuously in its travel, thereby eliminating the jamming, tearing, etc., which are so common in present-day machines.

While I have illustrated and described an operative and practical machine in the foregoing specification, I am aware that those skilled in the art will readily envision modifications there-

of characterized by the advantages to which I have referred; therefore I desire that the invention be construed sufficiently broadly to include any such modifications, to the extent that they fall within the scope of the appended claims.

I claim:

1. In a machine for setting up knocked-down cartons of the type characterized in knocked-down condition by a folded longitudinal partition connected to the side walls of the carton, means for feeding the cartons longitudinally, a blade engageable with the longitudinal partition from a direction transverse the direction of carton travel to erect the same internally of the carton and between the side walls thereof, and means for engaging said blade with said longitudinal partition to erect the same as the longitudinal feed of the carton continues, including means for moving said blade in a longitudinal direction in synchronization with the carton and at an angle to and coplanar with its path of longitudinal travel in so engaging the partition.

2. In a machine for setting up knocked-down cartons of the type characterized in knocked-down condition by transverse partitions attached to a pair of carton side walls and folded longitudinal partition connected to the side walls of the carton, means for feeding the cartons longitudinally, a blade engageable with the longitudinal partition from a direction transverse the direction of carton travel to erect the same internally of the carton and between the side walls thereof, means for engaging said blade with said longitudinal partition to erect the same as the longitudinal feed of the carton continues, including means for moving said blade in a longitudinal direction in synchronization with the carton and at an angle to and coplanar with its path of longitudinal travel in so engaging the partition, and means to erect and engage said transverse partitions with the erected longitudinal partition.

3. In a machine for setting up knocked-down cartons of the type characterized in knocked-down condition by a folded longitudinal partition connected to the side walls of the carton, means for feeding the cartons longitudinally, a blade engageable with the longitudinal partition from a direction transverse the direction of carton travel to erect the same internally of the carton and between the side walls thereof, means for engaging said blade with said longitudinal partition to erect the same as the longitudinal feed of the carton continues, including means for moving said blade in a longitudinal direction in synchronization with the carton in so engaging the carton, and further means for moving said blade at an angle to and coplanar with its path of longitudinal travel in so engaging the partition.

4. In a machine for setting up knocked-down cartons of the type characterized in knocked-down condition by a folded longitudinal partition connected to a pair of walls, means for moving the cartons longitudinally and parallel to said last named partition, a blade engageable with the longitudinal partition from a direction transverse the direction of carton travel to erect the same internally of the carton walls, and means for engaging said blade with said longitudinal partition to erect the same as the longitudinal feed of the carton continues, including means to actuate said blade in synchronization with the carton movement laterally and in a longitudinal direction paralleling the path of longitudinal carton travel in so engaging the partition.

5. In a machine for setting up knocked-down cartons of the type characterized in knocked-down condition thereof by transverse partitions and a folded longitudinal partition connected to the side walls of the carton, means for moving the cartons longitudinally and parallel to said last named partition, a blade engageable with the longitudinal partition from a direction transverse the direction of carton travel to erect the same internally of the carton, means for engaging said blade with said longitudinal partition to erect the same as the longitudinal feed of the carton continues, including means to actuate said blade in synchronization with the carton movement laterally and in a longitudinal direction paralleling th path of longitudinal carton travel in so engaging the partition, and means acting on said transverse partitions to erect and engage the same with the erected longitudinal partition.

6. A carton set-up machine comprising means for feeding knocked-down partition-type cartons in a linear path along the machine, opposed chutes along said path coacting with cartons to erect the same to generally rectangular outline, a partition erecting head acting transversely of said path to manipulate certain cross partitions of the carton to erected position in the carton, and means for restraining the carton during operation thereon by said head.

7. A carton set-up machine comprising means for feeding knocked-down partition-type cartons in a linear path along the machine, opposed chutes along said path coacting with cartons to erect the same to generally rectangular outline, a partition erecting head acting transversely of said path to manipulate certain cross-partitions of the carton to erected position in the carton, an element acting in the opposite transverse direction to erect a longtudinal partition internally of the carton, and means for restraining the carton during operation thereon by said head and element.

8. A carton set-up machine comprising means for feeding knocked-down partition-type cartons in a linear path along the machine, opposed chutes along said path coacting with cartons to erect the same to generally rectangular outline, a partition erecting head acting transversely of said path and provided with pairs of relatively movable members acting to engage and positively manipulate certain cross partitions of the carton to erected position in the carton, an element acting in the opposite transverse direction to engage and erect a longitudinal partition internally of the carton and engage the same with said transverse partitions, said element being provided with notches on a longitudinal partition-engaging portion thereof to avoid engagement with said erected transverse partitions, and means for restraining the carton during operation thereon by said head and element.

9. A carton set-up machine for cartons characterized in collapsed knocked-down condition by substantially coplanar longitudinal and transverse partitions which in erected, set up condition are disposed between side walls of the carton and engaged at right angles with one another, comprising means for feeding knocked-down cartons in a linear path along the machine, means acting on the cartons during movement to erect the same to generally rectangular outline, opposed partition erecting members acting

transversely of said path to erect and engage said longitudinal and transverse partitions of the carton, and means for restraining the carton during operation thereon by said members.

10. A carton set-up machine for cartons characterized in collapsed knocked-down condition by a substantially flat partition structure including elements which are disposed between side walls of the carton and at a right angle to one another in the set-up, erected condition, comprising means for feeding knocked-down cartons in a linear path along the machine, chute means adjacent said path coacting with the cartons to erect the same to a generally rectangular outline, and partition erecting means acting transversely of said path to manipulate certain elements to said partition structure of the carton to an erected position, said chute means including means adjacent said partition erecting means for restraining the carton during operation thereon by the latter.

11. A carton set-up machine for collapsed cartons of the type having a body and mutually engageable transverse and longitudinal partitions, comprising a carton receiving magazine, means for feeding a carton out of said magazine, and in a linear path therefrom, means adjacent said path for shaping the carton body to generally erected condition, and orbitally traveling head coacting with said transverse partitions to erect the same to a generally upright position internally of said shaped carton body, an oscillatory element engageable with said longitudinal partition to erect the same, said head and element coacting to lockingly engage the longitudinal and transverse partitions with one another, means to actuate said head and element in timed relation, and means to restrain the carton during operation thereon by the head and element.

12. A carton set-up machine for collapsed cartons of the type having a body and mutually engageable transverse and longitudinal partitions, comprising a carton receiving magazine, means for feeding a carton out of said magazine, and in a linear path thereform, means adjacent said path for shaping the carton body to generally erected condition, an orbitally traveling head coacting with said transverse partitions to erect the same to a generally upright position internally of said shaped carton body, an oscillatory element engageable with said longitudinal partition to erect the same, said head and element coacting to lockingly engage the longitudinal and transverse partitions with one another, means to actuate said head and element in timed relation, comprising a chute adjacent said head and element to restrain the carton during operation thereon by the head and element, said chute being open at the sides thereof to permit entry of the head and element.

13. A carton set-up machine for collapsed cartons of the type having a body and mutually engageable transverse and longitudinal partitions, comprising a supporting surface, means engageable with a carton and operable to advance the same in a linear path over said supporting surface, means to retract said carton engaging means from engagement with the carton at an intermediate point in said path of carton travel, means for shaping the carton body to generally erected condition as it traverses said path, and means adjacent said point in said path to erect and engage said partitions internally of the carton body.

14. A carton set-up machine for collapsed cartons of the type having a body and mutually engageable transverse and longitudinal partitions, comprising a supporting surface, means engageable with a carton and operable to advance the same in a linear path over said supporting surface, means to retract said carton engaging means from engagement with the carton at an intermediate point in said path of carton travel, means for shaping the carton body to generally erected condition as it traverses said path, means adjacent said point in said path to erect and engage said partitions internally of the carton body, and means to return said carton engaging means into engagement with the carton to further the advancement thereof.

15. A carton set-up machine for collapsed cartons of the type having a body and mutually engageable transverse and longitudinal partitions, comprising a supporting surface, means engageable with a carton and operable to advance the same in a linear path over said supporting surface, means to retract said carton engaging means beneath said surface at an intermediate point in said path of carton travel, means for shaping the carton body to generally erected condition as it traverses said path, means adjacent said point in said path to erect and engage said partitions internally of the carton body, and means to return said carton engaging means above said surface and into engagement with the carton to further the advancement thereof.

16. A carton set-up machine for collapsed cartons of the type having a body and mutually engageable transverse and longitudinal partitions, comprising a carton receiving magazine, means for feeding cartons in a linear path from said magazine, chute means adjacent said path for shaping the body to generally erected condition during travel, means to erect and engage the partitions in the body, comprising a transversely movable head coacting with said transverse partitions to erect the same, a transversely movable element engageable with said longitudinal partition to erect the same, and means integral with said chute means to restrain the carton during operation thereon by the head and element.

17. In a carton set-up machine for cartons of the type having a longitudinal partition and a plurality of transverse partitions engageable with the longitudinal partition in erected condition of the carton, means for feeding knocked-down cartons longitudinally, progressively conformed chute means engageable with said carton to progressively erect the body thereof during longitudinal travel, means disposed adjacent the path of travel and engageable with the transverse and longitudinal partitions to erect the same within the erected body of the carton, means actuating said last named means in a combined longitudinal and transverse direction relative to said path to advance the carton longitudinally while erecting the partitions, and means to interrupt feed of the carton by said feeding means adjacent said partition erecting means.

18. In a carton set-up machine for cartons of the type having a longitudinal partition and a plurality of transverse partitions engageable with the longitudinal partition in erected condition of the carton, continuously operative means for feeding knocked-down cartons longitudinally, progressively conformed chute means engageable with said carton to progressively erect the body thereof during longitudinal travel.

means disposed adjacent the path of travel and engageable with the transverse and longitudinal partitions to erect the same within the erected body of the carton, means actuating said last named means in a combined longitudinal and transverse direction relative to said path to advance the carton longitudinally while erecting the partitions, and means to render said feeding means intermittent in operation adjacent said partition erecting means.

19. In a carton set-up machine for cartons of the type having a longitudinal partition and a plurality of transverse partitions engageable with the longitudinal partition in erected condition of the carton, means for feeding knocked-down cartons longitudinally, progressively conformed chute means engageable with said carton to progressively erect the body thereof during longitudinal travel, means disposed adjacent the path of travel and engageable with the transverse and longitudinal partitions to erect the same within the erected body of the carton, means actuating said last named means in a combined longitudinal and transverse direction relative to said path to advance the carton longitudinally while erecting the partitions, means to interrupt feed of the carton by said feeding means adjacent said partition erecting means, and means to resume feed of the carton by said feeding means following operation thereof by said partition erecting means.

20. In a carton set-up machine for cartons of the type having a longitudinal partition and a plurality of transverse partitions engageable with the longitudinal partition in erected condition of the cartons, means for feeding knocked-down cartons longitudinally of the machine in a straight line path paralleling said longitudinal partition, progressively conformed chute means engageable with the sides of said carton to progressively erect the body thereof during travel, partition erecting means disposed adjacent one side of said path of travel and engageable with the transverse partitions to erect the same to parallel relation within the erected body of the carton, said last named means traveling in a combined longitudinal and transverse direction relative to said path of travel and including individually movable members engageable with said transverse partitions in the operation thereof, further partition erecting means disposed adjacent the opposite side of said path and engageable with said longitudinal partition to erect and engage the same with said transverse partitions, said last named means traveling longitudinally and transversely of said path in the operation thereof, means to actuate the respective partition erecting means, and means for laterally restraining the body of the carton during operation thereon by said respective partition erecting means.

21. In a carton set-up machine, continuously operating means for feeding cartons, comprising carton engaging and advancing members in advancing engagement with the cartons, means engageable with a carton to at least partially erect the same during advancement by one of said members, means to further the erection of the carton, means to disengage the advancing member from the carton during at least a portion of the phase of operation thereon by said last named means, said last named means including means imparting motion thereto in the direction of its advance by said member, and means to re-engage the member with the carton for further advancement thereby.

22. In a carton set-up machine, a supporting surface, continuously operating means for feeding cartons over said surface, comprising an endless chain having carton engaging and advancing members projecting above said surface in advancing engagement with the cartons thereon, means engageable with a carton to at least partially erect the same during advancement by one of said members, means to further the erection of the carton, means to retract below the surface and disengage the advancing member from the carton during at least a portion of the phase of operation thereon by said last named means, and means to re-engage the member with the carton for further advancement thereby.

23. A carton set-up machine for cartons characterized in collapsed knocked-down condition by substantially coplanar longitudinal and transverse partitions which in erected, set up condition are disposed between side walls of the carton and engaged at right angles with one another, comprising a magazine, means for feeding out collapsed cartons from the magazine one at a time, a chain having carton advancing lugs thereon, opposed chutes for shaping the carton body to a form in which the walls are in generally upright relation, a longitudinally and transversely traveling longitudinal partition inserting blade, a cross partition erecting head operating in opposed relation to said blade, means moving said head and blade in engagement with said respective partitions and in directions parallel to and transversely of movement of the carton, and means for holding the carton during operation thereon by said head and said blade, said means comprising an elongated chute sufficiently open at its sides to permit extension thereinto of said head and said blade, said chute having an inwardly bent lip thereon which engages the upper portion of a carton wall.

24. In a carton set-up machine for cartons of the type having a bottom insertable into latched relation to certain upright transverse partitions, means to cause cartons to travel through the machine, a bottom and longitudinal partition erecting mechanism comprising a blade, means for imparting movement thereto in the direction of travel of a carton advancing through the machine, and means operatively connected to said last named means for extending said blade into operational engagement with the carton bottom and longitudinal partition while continuing the movement of the blade in synchronized relation to the carton in the direction of carton travel.

25. In a carton set-up machine for cartons characterized in erected condition by a bottom and longitudinal partition forming part extending between a pair of side walls and by transverse partitions disposed in spaced parallel relation normal to said part, which partitions are in coplanar relation in non-erected condition and disengaged from said part, means for advancing a carton along a linear path of travel, transverse partition erecting means for shifting the transverse partitions from coplanar to spaced parallel relation, said transverse partition erecting means traveling in a circular path, means located opposite said transverse partition erecting means and operatively connected thereto to insert the carton bottom and longitudinal partition forming part thereof into engagement with the transverse partitions, said last named means traveling in an oscillatory path having a component paral-

leling the carton travel while in engagement with said part.

26. In a carton set-up machine for cartons characterized in erected condition by a bottom and longitudinal partition forming part extending between a pair of side walls and by transverse partitions disposed in spaced parallel relation normal to said part, which partitions are in coplanar relation in non-erected condition and disengaged from said part, means for advancing a carton along a linear path, transverse partition erecting means for shifting the transverse partitions from coplanar to spaced parallel relation, said transverse partition erecting means traveling in a circular path, means located opposite said transverse partition erecting means and operatively connected thereto to erect the carton bottom and longitudinal partition forming part thereof into engagement with the transverse partitions, said last named means traveling in an oscillatory path having a component paralleling the carton travel while in engagement with said part, said carton advancing means being temporarily disengaged from said carton during the work stroke of said transverse partition erecting means and the means opposite thereto and reengaging the carton to discharge it upon completion of their working operation.

27. In a machine to set up collapsed cartons of the type folded along a bottom medial fold line and medially along a panel comprising side by side transverse partitions, means to hold a stack of said cartons with the transverse partitions extending in a direction rearwardly of their path of travel, means to eject cartons one at a time from the stack, means to form the carton body into box-like form, orbitally traveling means to engage and place the transverse partitions in parallel relation, and means to engage and insert the bottom into engagement with the transverse partitions, said partition and bottom engaging means traveling longitudinally with said cartons while in engagement therewith.

28. A machine to set-up knocked-down cartons having cross partitions swingable downwardly along opposed hinges and engageable with the carton bottom, comprising a hopper having a reciprocating dog operable rearwardly of the carton and beneath the folded-down partitions, roller means forwardly of the hopper to withdraw the carton from the dog, a carton body distending chute, means operable on the rear carton wall to advance cartons endwise through said chute, a partition depressing head operative to swing said cross partitions to parallel relation to one another, a carton bottom erecting means operative to engage said carton bottom with said parallel cross partitions, said head and bottom erecting means traveling longitudinally in engagement with said carton as it moves in said chute, and means to eject set-up cartons from said chute.

29. In a carton set-up machine, means for feeding out and advancing cartons one by one in a forward longitudinal direction, means for distending the carton body walls during the forward progress of the carton, said means comprising spaced, continuous and longitudinally converging, curved chutes, tending from the horizontal to the vertical as they converge, a carton body retaining chute into which the first named chutes merge, and means for further operating upon the carton while the carton is supported in said last named chute, said last named means engaging and traveling longitudinally with said carton as it moves in said chute.

30. Carton set-up mechanism for cartons characterized in collapsed knocked-down condition by substantially coplanar longitudinal and transverse partitions which in erected, set up condition are disposed between side walls of the carton and engaged at right angles with one another, comprising means to progress knocked-down cartons in a straight line, forward direction, carton shaping chute means adapted to open the carton body from a flattened to an open condition and to retain said carton in that shape, a transverse partition positioning head traveling in and out of said chute means in an orbital path and engaging said transverse partitions during a longitudinal component of its motion to erect the same, and a longitudinal partition erecting element operating in timed relation to said head for engaging and erecting the longitudinal partition into interlocked relation to said transverse partitions while they are engaged by said head.

31. Carton set-up machinery for cartons characterized in collapsed knocked-down condition by substantially coplanar longitudinal and transverse partitions which in erected, set up condition are disposed between side walls of the carton and engaged at right angles with one another, comprising a magazine, means to progress knocked-down cartons away from said magazine, shaping forms adapted to open the carton body from a knocked-down to an open condition, an orbitally traveling transverse partition erecting head operable adjacent that part of the shaping forms wherein the carton body is in open position to engage and erect said transverse partitions during a longitudinal component of its orbital motion, and a longitudinal partition erecting bar operable in timed and opposed relation to said rotating head for engaging and interlocking the longitudinal partition with the transverse partitions while the latter are engaged by said head.

32. In a set-up machine for collapsed egg cartons having transverse partitions interengageable with a carton bottom extending between side walls thereof, the transverse partitions of which cartons are folded to form a two-ply layer above other parts of the carton, means for feeding said cartons endwise in a direction paralleling said walls, chute type means for spacing the coplanar transverse partitions from said other parts of the carton, means engaging and bringing the transverse partitions into substantially parallel relation during endwise feed thereof, and means for interengaging the bottom and the transverse partitions while the latter are engaged by said last named means.

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