AUTOMATIC PARTITION ASSEMBLY MACHINE

Simon E. Schroeder, Oshkosh, Wis., assignor, by mesne assignments, to Clinton Foods Inc., New York, N. Y., a corporation of Delaware

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The present invention relates to a novel machine and apparatus for fabricating or forming and assembling partitions of paper board, chipboard, or the like, and which partitions are of the type generally employed in containers or containers for dividing such containers or containers into individual cells, pockets or compartments for receiving bottles, glassware, or other fragile articles, although it will be apparent that such partitions are adapted for use wherever it is desired to effect optimum protection for the contents of containers or containers.

Another important object of the present invention is the provision of an automatic machine or mechanism for forming or fabricating the two sets of interlocking partitions and assembling such partitions in their interlocking relation and ready for use. This novel mechanism is so constructed and designed as to automatically punch, shear and assemble such partitions in a minimum of time whereby the output of such machine is greatly enhanced.

It is another object of the present invention to provide a machine or apparatus having novel means and mechanism for simultaneously forming two sets of interlocking partitions and assembling such partitions ready for use, and in which the sequence of operations are performed in a novel manner.

Another object of the invention is to provide a novel partition fabricating and assembling machine that is readily adjustable to punch, shear and assemble partitions of different dimensions and in which the cellular capacities of the assembly may be quickly varied.

A further object of the present invention is the provision of a novel clutch assembly for intermittently feeding the paper stock longitudinally through the punching and shearing operations in timed relation and sequence. A still further object is the provision of a novel variable speed feed mechanism for withdrawing the web of paper from the supply roll at a predetermined rate for the most effective operation of the machine. The speed of this feed mechanism varies in accordance with the amount of paper available for feeding to the punching and slitting mechanism, and in the illustrative embodiment is determined by the loop of paper formed intermediate the feeding rolls and the punching and slitting dies.

Another object of the present invention is the provision of a novel means and mechanism for delivering one set of the partitions to the assembler in aligned and timed relation and for delivering and assembling the punched and slotted web of paper with the aligned slots in the first mentioned partitions and shearing the web upon such assembly to form the second set of partitions. The invention further comprehends a novel means at the discharge end of the delivery chutes for moving a succeeding set of partitions into position whereby the adjacent ends of succeeding partitions are in overlapping relation, thereby resulting in accurate alignment of the partitions and increased speed of operation.

Another object of the invention is the provision of a novel means and mechanism for breaking the kink in the paper as it leaves the roll and thereby straightening the paper prior to its being fed to the piercing dies. This re-rolling or reverse kinking is important when operating with chipboard or relatively heavy paper and especially when the diameter of the feed roll is reduced and the supply of paper on such roll is being exhausted.

The invention further comprehends a novel means and mechanism for guiding the paper stock into and between the cutting or shearing blades, and to positively discharge the formed partitions after such cutting or shearing operation has been accomplished.

A further important object of the present invention is the novel means and manner of transporting one set of partitions for assembly with another set to complete the assembly.

Further objects are to provide a construction of maximum simplicity, efficiency, economy and ease of assembly and operation, and such further objects, advantages and capabilities as will later more fully appear and are inherently possessed thereby.

The invention further resides in the construction, combination and arrangement of parts illustrated in the accompanying drawings, and while there is shown therein a preferred embodiment it is to be understood that the same is susceptible of modification and change and comprehends other details, arrangements of parts, features and constructions without departing from the spirit of the invention.

In the drawings:

Figure 1 is a diagrammatic top plan view of the assembly and component parts of the present automatic partition assembly machine.

Figs. 2 and 3 are views in perspective of the longitudinal and transverse partitions, respectively.

Fig. 4 is a view in perspective of the partitions of Figs. 2 and 3 in assembled relation.

Fig. 5 is a view in side elevation of the feeding mechanism for feeding the web of paper for forming the transverse partitions from the supply roll, some of the parts being shown in vertical cross-section for a clearer disclosure.

Fig. 6 is a view in side elevation of the means and mechanism for punching and slitting and for cutting the punched and slotted web into a predetermined number of individual transverse partitions.

Fig. 7 is a view in vertical cross-section through the spring-loaded connecting rod and taken on the line 7—7 of Fig. 6.

Fig. 8 is a top plan view of the disclosure of Fig. 6.

Fig. 9 is a longitudinal vertical cross-sectional view taken in a plane represented by the line 9—9 of Fig. 8.

Fig. 10 is a view in vertical cross-section taken in a plane represented by the line 10—10 of Fig. 8.

Fig. 11 is a fragmentary view in vertical cross-section taken in a plane represented by the line 11—11 of Fig. 8.

Fig. 12 is a view in vertical cross-section taken on the irregular line 12—12 of Fig. 11.

Fig. 13 is a fragmentary perspective view of the novel actuating plate and associated parts of the clutch mechanism shown in Figs. 11 and 12.

Fig. 14 is a perspective of the arcuate plate and guide of the clutch mechanism.

Fig. 15 is a view in vertical cross-section taken in a plane represented by the line 15—15 of Fig. 8.

Fig. 16 is a fragmentary view of the left end portion of Fig. 15 but showing the mechanism adapted or adjusted...
for operation with a five cell or pocket partition rather than the four cell or pocket partition of Fig. 15.

Fig. 17 is a view in vertical cross-section through the assembler unit shown at the upper left hand corner of Fig. 16, and while punch 24, slits, assemblies and shears the second set or longitudinal partitions upon assembly with the first set or transverse partitions.

Fig. 18 is a fragmentary enlarged view in horizontal cross-section taken in a plane represented by the line 18—18 of Fig. 17.

Fig. 19 is a fragmentary enlarged view in horizontal cross-section taken in a plane represented by the line 19—19 of Fig. 17.

Fig. 20 is a fragmentary view in perspective of the assembly unit and showing the manner of feeding the longitudinal partitions, assembling the longitudinal with the transverse partitions, and cutting off or shearing the longitudinal partitions when assembled.

Fig. 21 is a fragmentary view, part in end elevation and part in vertical cross-section, of the assembler unit of Fig. 20, and showing the manner of cutting off the longitudinal partitions, some of the parts having been omitted for the sake of clarity.

Fig. 22 is a fragmentary view in perspective of the mechanism for discharging the transverse partitions after the web has been passed through the piercing and cutting dies and the severed partitions are about to be discharged.

Fig. 23 is a top view of the drive mechanism for the feed rolls.

Fig. 24 is a top view of the discharge end of one of the delivery chutes for the transverse partitions shown in Fig. 18, but showing the succeeding partition being moved into position.

Referring more particularly to the novel illustrative embodiment shown in the drawings, Fig. 1 shows diagrammatically the complete assembly for automatically and simultaneously forming and assembling the preformed transverse and longitudinally extending partitions and delivering the partitions as an assembled unit.

The novel assembly or machine comprises mechanism for feeding to each set of punching dies a web of paper as it is withdrawn from the supply rolls, punching the webs to form the desired slots, shearing the punched webs into partitions of the desired dimensions and the assembly of the required or desired number of partitions interengaging or interlocking relation.

As more clearly shown in Fig. 5, there is provided a supply roll 1 from which is fed a web of paper 2 and this passes over an idler roller 3 and then between an arm 4 and roller 5. The idler roller is vertically and accurately adjustable by suitable manual controls means to keep the web in the paper as the amount of paper on the supply roll 1 is decreased. To accomplish this, the shaft 6 of the idler roller 3 is rotatably mounted at its opposite ends in side brackets 7 pivotally mounted at one end on a stub shaft 8 and at its other end provided with a vertically disposed lever arm or rod 9 adapted to be manually raised or lowered and thereby raising and lowering the side brackets 7 and the idler roller 3 carried thereby. Any suitable means such as a notched plate for holding the lever arm or rod in any one of a series of elevated positions may be provided for retaining the brackets and idler roller in any desired position for accomplishing the adjustment of the latter, and thereby assuring that the web of paper is in proper condition for feeding to the rollers 4 and 5.

The speed of rotation of the feed rollers 4 and 5 is adjusted through a loop forming mechanism comprising an arm or rod 11 pivotally mounted in the upright or support 12 providing a part of the frame 13, the arm at its forward or free end being provided with a laterally projecting pin 14 carrying a small roller 15 continuously disposed upon an end of the web 2 of the paper to form a loop 16 in the web being fed so as to ensure a sufficient length of paper being available for feeding to the punch-
tensionally supported between the uprights or bearing standards 67, 67 and beneath the horizontally disposed upper plate 68. The lower end of each bearing 59 seats upon a coil spring 69 and with the upper end disposed between coil spring 70 and the casing 72.

As clearly disclosed in Figs. 6, 11 and 12, the crank 53 is pinned to one end of a drive shaft 72 journalled in a clutch and intermittent driving unit housed within the casing 73. Loosely mounted upon and adjacent the other end of the shaft 72 is a pinion 74 in continuous mesh with and under engagement with a gear segment 75 having its lower end pivotally mounted on the stub shaft 76. To oscillate this gear segment, a connecting rod 77 is pivotally mounted at one end 78 upon the pin or projection 79 on the gear segment 75. This connecting rod comprises a tubular member 81 and a rod 82 having its upper end 83 tensionally mounted in the number 81 and its lower end 84 threaded into a sleeve member 85 pivotally connected to the block 86 and adjustable mounted in the guide or gib-way 87 secured to the cam plate 88 which in turn is pinned or keyed to a shaft 89 disposed transversely of the machine. Also secured to and rotatable with the cam plate 88 is a cam 91. A roller 92 carried in the bifurcated end of a push rod 93 and connected to the bifurcated end 94 of a link 95 pivoted at its upper end upon a stud 96 projecting from the side plate 97, permits pivotal movement of the link 95 and through connecting part 99 pivotally connected to the annular actuating plate or disc 101 in the casing housing the clutch and intermittent driving unit 110. A spring 102 secured at one end to the side plate 97 and its other end secured to the connecting part 99, maintains the roller 92 in contact with the face of the cam 91.

The clutch and intermittent driving unit (see Fig. 11) in addition to the actuating plate 101, includes the pinion 74 mounted or formed on one end of the hub or spool 102 and on the other end of this hub or spool is provided an annular driving flange 103 provided with a plurality of radial strengthening webs 104. The hub or spool and its connecting parts are rotatably mounted on the bearing assembly 165 comprising the reduced step 166 of the shaft 72. End bearings 167 are provided on the opposite ends of the shaft 72, the one adjacent the pinion 74 being held in place by an end strap 168, while the bearing at the opposite end seats within a counterbore in the end of the casing or housing 73.

The driving flange 103 is provided on its rear face with a friction material 111 against which engages a plate 112 loosely encompassing and slidably on the drive shaft 72. This plate is pressed into contact with the friction material by a plurality of suitably spaced coil springs 113 carried in pockets or recesses 114 provided in a drive plate 115 pinned to the drive shaft 72. The plate 112 and drive plate 115 are rotatably connected by a plurality of suitably spaced pins 116 carried by and projecting from the rear surface of the plate 112 and projecting through openings in the drive plate 115 whereby when the plate 112 is rotated, it carries along the drive plate 115 and drive shaft 72 to thereby rotate the drive arm 53, drive pin 53A and its associated gears 54 and 56.

As the shaft 72 and its associated drive plates 112 and 115 are to rotate in but one direction, and as the pinion 74 and drive plate 115 have the same motion of the plate 115 during rotation of the pinion 74 in the other direction. This is accomplished by providing the actuating plate 101 with spaced cam wedges 117 each adapted to be moved into and out of contact with a roller 118 rotatably mounted in an arcuate channel 119 in the ring 121. Thus as the actuating plate is moved in a clockwise direction as viewed from the front face of the plate, or in the direction of the arrow in Fig. 13 which shows the rear face of the plate, the cam wedges 117 force the rollers 118 and the ring 121 rearwardly whereby the friction material 122 carried on the rear surface of this ring engages the overhanging flange of the plate 115 and forces this plate out of frictional and driving contact with the friction material 111 on the driving flange 103. As the actuating plate 101 is moved in the opposite direction or counter-clockwise (when viewed from the front of the plate) by the connecting part 99 on the rod 89, these cam wedges 117 disengage and the spring-pressed plungers 123 which engage the protruding ends of the pins 124 on which the rollers 118 are mounted, force the ring 121 and its rollers 118 forwardly sufficient to release contact between the plate 112 and the friction material 122, and allows the plate 112 to again frictionally engage the material 111, thus re-establishing driving contact therebetween.

To prevent the ring 121 from rotating, there is provided a plate 125 having a slot 126 at its forward end to receive a roller 127. This slot is of such depth as to allow for axial movement of the ring 121 sufficient to ensure the drive plate 112 and disengage the latter from the friction material 111.

To permit free oscillation of the actuating plate 101, there are provided spaced retainers 128 each having sets of radial bearings 129 and thrust bearings 130 disposed on the faces of the bearings being maintained within the retainers by end plates 132. Sufficient space is provided within these retainers to allow for free movement of the bearings.

To drive the cam plate 88 and the clutch and intermittent driving unit above described, as well as to supply power for the entire assembly, there is provided a motor 133 having a pulley 134 on one end of the drive shaft 135 which through the belt or belts or other driving means 136 drives the pulley 137 on a driven shaft 138 in the gear box 139. This gear box contains suitable speed reduction gearing for operating a plurality of drive shafts and other mechanism to be later described. One of the drive shafts emanating from the gear box 139 is the shaft 141 on which is mounted a pulley 142 for driving the belt 143. This shaft continues through the assembly and at its forward end is provided with a pinion 143 in mesh with a pair of larger gears 144 and 145, the former being pinned or keyed to and driving the shaft 146 and the latter gear 145 being pinned or keyed to and driving the shaft 99. The gear 144 is in mesh with and drives a gear 147 pinned to and driving its shaft 148 (see Figs. 1, 6, 8 and 9).

The shafts 146 and 89, the latter in addition to operating the clutch and intermittent drive in the housing 73, raise and lower the upper punch or die plate 49 carried by the spaced heads 149. Spaced supports 151 for the die bed 48 have their opposite ends mounted upon the side plates 97 of the frame and in turn upon the base 150. The spaced heads 149 are carried at their opposite ends in the sliding blocks 152 mounted upon and adjustable with relation to the rails 153. Each rail is secured to the upper ends of spaced elevating plungers 154, the lower end 155 of each plunger being threaded and connected to a reciprocating guide block or piston-like member 156 connected by a wrist pin 157 to a connecting rod 158 eccentrically mounted on the end of the shaft 146. Each plunger and associated parts are housed within a standard 159 suitably mounted on the side frames 97. The same assembly is mounted on the body of the shaft 89. Thus as the shafts 89 and 146 are rotated the plungers 154 are associated therewith elevate and lower the rails 153 and the heads 149 to thereby actuate the punch assembly 49 which pierces the web 2 when it is moved into the space between the punch and die. Suitable leader pins or guides 161 assure accuracy in the operation of the punch. A bin 162 provides a receptacle for any trimmings from the punching operation.

The shaft 148 at its opposite ends is provided with an
eccentrically mounted connecting rod, wrist pin and guide block housed in a standard 159, similar in construction and operation to that just described, but with the upper end of its elevating plungers 163 secured to a sleeve 164 provided at each of the opposite ends of a cross head 165. Disposed at each side of the machine is an eccent- gated longitudinally extending supporting member 166 for supporting the shearing knives. To elevate and lower these supporting members and shearing knives during the shearing operation, which operation is syn- chronized with the punching operation, one end 167 of each supporting member 166 is secured to the cross head 165 and the other end of each such supporting member is supported upon a vertically operating link 168 and guided in its vertical movement by a leader pin or guide 169.

To assure movement of these supporting members 166 in a horizontal plane, a novel equalizing mechanism is provided for transmitting the vertical movement of the elevating plungers 163 thereto. This is more clearly shown in Fig. 6 and comprises a vertical link 171 connected at its upper end 172 by a pin 173 to the end 167 of the supporting member 166. As shown in Fig. 22, this upper end 172 is received within a slot 174 and the lower end 175 of this link is pivotally connected at 176 to one end of a rocker arm or walking beam 177 pivotally mounted at 178 in the frame 179. The other end of this rocker arm or walking beam is pivotally connected to one end of a link 181 with the other end of this link pivotally connected to the adjacent end of a similar rocker arm or walking beam 182 pivotally mounted at 183 in the frame 179. The other end of this rocker arm is pivotally connected at 184 to the lower end of the vertically operating link 168 which is pivotally mounted at 185 to the overhanging end 186 of the supporting member 166. This construction and arrangement of supporting members 166 at the opposite sides of the machine overcomes any tendency for the weight thereof to cause extreme leverage and maintains the supporting members in a horizontal plane and movement.

The shearing assembly (see Figs. 6, 8, 9, 15 and 22) includes a plurality of upper shearing units 187 extending across or spanning the longitudinally extending support- ing members 166 and having its opposite ends 188 suitably connected thereto. These shearing members are equal in number with the number of transverse partitions 189 to be cut and include a knife or shearing member 190 with the units suitably spaced apart in accordance with the width or depth of such partitions and held in such desired spaced relation by the clamping blocks 191 which anchor these shearing units onto the side flange 192 of the supporting members 166. These upper shearing units are each provided with upper and lower strengthening ribs 193 and 194, respectively, and are guided in their vertical movement by the spaced uprighting or vertical leader or guide pins 195 mounted on the base plate 196 which also support the ends of the lower knives or stationary shearing blades 197 upon the uprights or standards of the frame 179. The lower knives or stationary shearing blades 197 are each mounted in a cross bar 198, and this unit assembly is adjustable in a manner similar to the upper shearing units and held in such adjusted relation.

The web of paper 2 after it has been intermittently fed into the spaces between the punching dies, is drawn by the feed rollers 51 and 52 between the spaced upper and lower longitudinally extending guide strips 199 and 201, respectively, and then between the spaced cross straining bars 202 until the web of paper is properly located between the lower knives or cutter blades 197 which remain stationary, and between these blades and the upper shearing blades 199, whereupon the upper shearing members are moved downwardly and shear the web into a plurality of transverse partitions 189, the number depending on the number of blades or shearing members employed. In the present illustrative embodiment, five shearing members are employed, but that number may be quickly varied depending upon the number of such partitions required or desired in the complete assembly. As the drive for the punching and shearing operations is synchronized, it is to be under- stood that the web is punched to subsequently form one set of partitions 189 at the same instant that a previous punched or pierced web section is cut or sheared to form the separate partitions.

To discharge the separate partitions 189 from the cutting or shearing assembly, there is provided for each a transverse shaft 204 carrying spaced collars 205 which are preferably adjustable along the shaft for accommodating a web of paper of any desired width. Secured to or formed integral with each collar 205 is a bar or strap 206 having its forward end bent at 207 whereby in its elevated or normal position as shown in Fig. 22, the extreme forward end of each bar or strap projects beneath the lower cutting knives 197. As these partitions are sheared, each is discharged by rotation of its associated shaft 204 and bar or strap 206, and to assure that the partition is carried downwardly with the bars or straps, on each is provided a finger or hook 208 projecting up and over the opposite ends of the partition to carry the partition downwardly and discharge it into one of a series of hoppers or troughs 209.

To rotate the series of spaced transverse shafts 204, an end of each is provided with a crank 211 having an eccentric pin 212 seating in a vertical slot 213 provided in the projection or extension 214 of a collar or sleeve 215 adjustable mounted on a longitudinal rod 216 extend- ing along the front of the machine, but pinned or secured to the rod in its adjusted position by a set screw or the like 217. This rod is of such length as to accommodate the desired number of cross or transverse shafts 204 and adjacent each end it is slidably mounted in a bearing strap or block 218 suitably affixed to the frame 179. Adjacent its left end and spaced to the right from the bearing 218, there is secured a collar 219 on the rod 216 and between this collar 219 and bearing 218 is provided a coil spring 221 which tends to move the rod and its associated collars or sleeves 215 to the right by the compression of the spring. The opposite end of this rod 216 is provided with a sleeve 222 bifurcated to receive a roller 223 which is maintained in contact with the face of the cam arm 224 pivotally mounted upon a pin or projection 225 on the frame 179. Pivotally connected to the cam arm 224 by means of a bifurcated sleeve 226 is a vertically movable rod 227 having an elongated slot 228 in its upper end 229 and adapted to receive a pin 230 projecting from a block 231. When the end 232 of the longitudinally extending supporting member 166.

Thus, it will be apparent that, as the supporting members 166 are raised and lowered by the plungers 163 and their associated mechanism, the rod 227 is reciprocated vertically by the pin 230 and rotates the cam arm 224 about its pivot. Since the roller in the end of the sleeve 222 on the rod 216 is maintained in engagement with the cam face by the spring 221, as the rod 227 is moved downwardly the rod 216 is moved to the left (Figs. 6 and 22) as the roller rides up to the cam face edge of greatest radius, thereby rotating the shaft 204 and the bars 206 supporting the severed partitions 189. This movement of the rod 216 occurs immediately following the part- tion strip cutting action. The cam face of the cam arm 224 is formed to effect this operation sequence so that, when the upper cutting or shearing knives 197 and the rod 227 are further lowered immediately after the shearing action, the shafts 204 are rotated in a clock- wise direction sufficiently to tilt the partitions 189 downwardly and discharge them into the chutes or hoppers 209 disposed therebelow. The slot 230 is of such length as to give a short dwell of the rod 227 around the partition 189 as the shearing blades start back up, which combines
with the face of the cam to permit the proper functioning of the discharge mechanism for positively discharging the partitions after they have been cut or sheared.

From the chutes or hoppers 209, the partitions 189 drop in this position. Movement of the partitions disposed in a substantially vertical plane upon the upper surface of a platform 233 or support from where they are moved longitudinally by one of a series of transverse rods 234 carried by endless chains 235 driven through a pair of sprockets 236. Each end of a rod is carried in an end of an arm 237 pivoted upon a shaft 238 upon a chain, with the rods disposed in a spaced relation and the timing of the machine is preferably so synchronized that the partitions, when discharged through the hoppers, fall upon the platform 233 between such transverse rods. The ends of the rods are disposed and guided in slots or guideways 239 formed in the side plates 240. The platform 233 is mounted in a fixed position at each side thereof by a bracket 241 and one or more braces or cross-beams 242 and the entire structure supported upon the base 243. These side plates 240 are longitudinally adjustable through the operation of a hand wheel 244 threaded in a bracket 245 secured to the forward or outer ends of these plates, and with the threaded shank 246 threaded into a plate 247 secured upon the base 243.

As more clearly in Fig. 15, the partitions 189 remain stationary upon the plate or platform 233 until the rearward or outer edge thereof is engaged by a transverse rod 234 which moves in unison a set of five of these partitions longitudinally of the plate or platform 233 or to the left as shown in Fig. 15. As these partitions are moved, they enter between spaced side plates 248 and 249 which converge at their forward end (see Fig. 8) and whereby the partitions leave the platform 233 and collect upon spaced horizontally arranged bars 251. The side plates 248 as shown in Fig. 20, are each provided with upper and lower spring-pressed straps 253 which engage the partitions and force them against the side plates 249 as shown in Figs. 18 and 24.

At the forward end of the platform 233 the slot 239 is so contoured at 254 as to permit the rods 234 to drop and disengage from the ends of the set of partitions being carried thereby. This released position places the set of partitions in aligned relation and in a position wherein the first slot 255 of the transverse partitions 189 is in alignment with a vertical web of paper 2° forming a longitudinal partition 256. As shown in Figs. 15 and 17, the movement of the rods 234 is of a rod 236 pivoted in the last slot 255, appearing at the right hand end of the transverse partitions, the forward or left hand ends of the following or succeeding transverse partitions 189 and the web of paper 2° forming this last longitudinal partition 256 in the assembly. Then as this last mentioned longitudinal partition is moved forwardly or to left to discharge the complete partition assembly, the rods 234 continue to move the set of transverse partitions 189 then moving into position until the first slot 255 is in a position to receive the end of the web 2° for forming the first longitudinal partition 256. Movement of the sprockets 236, chains 235 and rods 234 is transmitted thereto by the shaft 234° and its drive shaft C.

In order to move each longitudinal partition 256 an amount equal to the length of a section of 257 of a transverse partition 189 forming a cell, there is provided means for positively engaging each longitudinal partition and moving it the predetermined amount. Such means consist of a system of links and toggle arms actuating a pair of spaced upright bars 258 pivoted on a cross shaft 259 and carrying one or more cross bars 262 to which are attached a plurality of spaced upstanding arms 263. The upper ends of these fingers are curved at 264 and adjacent thereto bracketed by a spring-pressed rod 265 the lower end of which is adjustable or slidable mounted in a bracket 266 affixed to the rear of the cross bars 262. These spring fingers 263 positively engage and move the longitudinal partitions and the interlocking transverse partitions 189 forwardly a distance or section 257, but in case there is any possible jamming the ends of the fingers may be returned rearwardly by reason of their mounting.

To move the uprights 258 the desired amount, there are provided links 267 each connected at one end to one upright 258 and at the other end to an arm 268 pivotally mounted upon a rock shaft 269 journalled in brackets 271. Also secured upon the rock shaft 269 is one end of a link 272, the other end of which is connected through an adjustable connecting rod 273 to an end of a crank arm 274 mounted upon a stub shaft 275 disposed at one end of the machine in a gear casing A. It will thus be seen that as crank arm 274 is rotated through a predetermined arc, (the linkage connected therewith will move the uprights 258 through a predetermined arc and through the engagement of the spring fingers 263 with the adjacent longitudinal partition, move this partition and its associated or assembled transverse partitions an amount equal to the length of a section 257, as shown diagrammatically in Fig. 1, a spring finger 263 may engage each cell or section of the longitudinal partition 256 so as to assure positive movement of such partition throughout its length.

As seen in Fig. 17, the web of paper 2° after it has been sheared by the stationary cutting knife 276 and the movable cutting knife 277 to form a longitudinal partition, has its upper edge sheared and disposed a relatively small amount above the upper end of the transverse partitions 189, and to move or depress such longitudinal partition the remaining amount there is provided spaced spring fingers 278 under which the longitudinal partition 256 rides, and due to the curvature of the under side of the spring fingers 278 the longitudinal partition engaging therewith will be depressed into its assembled position and substantially flush or level with the upper edges of the transverse partitions 189.

To limit the movement of such assembled longitudinal partition and so that it is not moved by the spring fingers 263 an amount greater than the length of a section 257 of the transverse partition, the invention comprehends the provision of spaced depending members or projections 279 which are secured to a rock shaft 281 having at each end thereof a rocker arm 282 with the outer end of one of the rocker arms secured to a connecting rod 283 tensionally mounted at its lower end in a bracket 284 secured upon the outer end of a link 285, with the other end of the link mounted on a stub shaft 286. Rock shaft 286 is rotatably mounted in the bracket 271 and carries one end of an arm 287 which, at its outer end, pivotally supports an adjustable connecting rod 288 which, at its upper end, is pivotally connected to an arm 289.

The other end of the arm 289 is secured to a stub shaft 291 extending from the gear casing A. It is understood that the shaft 291 is rocked by well known gearing in the casing A.

Thus it will be seen that the spring fingers 263 are prevented from moving the longitudinal partitions 256 an amount greater than the distance or space of a cell 287 of the transverse partitions by reason of the engagement of the moved partition 256 with the projections or stops 279. However, as the succeeding longitudinal partition 256 is assembled and sheared, the stops 279 are rotated out of the path of the preceding partition 256 to allow for their free movement. The movement of the springs 263 and the stops 279 is synchronized through the gearing in the casing or housing A.

The web of paper 2° forming the longitudinal partitions (see Figs. 1 and 17) is fed from a supply roll (not shown) through a pair of feeding fingers 292 mounted upon the shafts 293, which feed rollers may be similar to the feed rollers 4 and 5 for supplying the web of paper 2°, and driven by a shaft 294 from a gear box 17 similar to
that shown in Fig. 5. The shafts 293 of the feed rollers are shown as mounted in a support 294 similar to the support in which the feed rollers 4 and 5 are mounted, and this support is provided with an idler roller 295 pivotally mounted at each of its opposite ends upon a bracket or arm 296, which arms in turn are pivotally mounted upon a transverse shaft 297 at the end of which is mounted a lever 298 and above the support 294 is mounted a quadrant 299 having spaced teeth 301. The lever 295 may be provided with a projection or lug 302 or any other suitable means adapted to enter a slot between the teeth 301 on the quadrant or notched plate for holding the lever in any suitable locked position, and in which position the idler roller 295 engages the web of paper 2 to straighten or unwind this paper, in the manner as explained with respect to the idler roller 3 (Fig. 5).

The web of paper 2 as it leaves the feed rollers 392 is fed over a contoured or curved plate 303 which directs the paper upwardly and then beneath a pivoted arm 304 and over a roller 305 mounted on the outer end of a weighted or counterbalanced arm 306. The arm 304 is pivotally mounted at 307 upon a frame 308 and intermediate its length is connected to an adjustable clevis 309 forming the lower end of a vertically extending rod 311 provided with a pair of adjustable collars 322 and 333 mounted in spaced relation on the rod. The rod 311 passes through an opening in a second plate 314 carrying at its outer end a mercoid switch 315, and which mercoid switch is connected to a change-speed mechanism similar to that shown in the housing 17 of Figs. 3 and 23, it being understood that when the loop of the web paper 2 is large the speed of rotation of the feed rollers 293 is decreased, and when the loop becomes small the mercoid switch 315 through clutching mechanism such as that previously described with respect to Figs. 3 and 23, will drive the rollers 293 at a greater speed so as to increase the size of the loop.

The web of paper then passes between a stationary piercing die 316 mounted upon a bed or support 317 vertically adjustable on the spaced uprights or ways 318 of a supporting frame 319. Spaced guides 320 facilitate feeding and alignment of the web. A movable piercing die or punch 321 is carried on a cross bar 322 having its ends 323 mounted upon the outer ends of a pair of reciprocating plunger or pusher rods 324 each guided in its bearing sleeve 325. As more clearly shown in Fig. 19, the inner end of the punch 321 is threaded into a sleeve or piston-like member 327 carrying a wire pin 328 for connecting this member to a connecting rod 329 mounted on the eccentric hub or boss 331 of a gear 332 mounted upon a fixed shaft 333. This gear is in mesh with and rotated by a collar or pinion 334 mounted or keyed to a drive shaft 335 through suitable gearing in the main gear box 139.

The punched and slotted web of paper 2 then passes downwardly between spaced fixed guides 336 and guides 337 movable relatively thereto. The fixed guides 336 are mounted upon a shear support 338 for the fixed shear blade 276, while the guides 337 are mounted upon a cross head 339 carrying the movable shearing blade 277. This cross head 339 is carried at its outer ends 341 upon a plunger or pusher rod 342 which is reciprocated by a mechanism similar to that shown in Fig. 19 for operating the movable punch. This includes a pinion 344 (not shown) mounted upon the drive shaft 342 driven from the main gear box 139 and in synchronization with the drive shaft 315 for the punch.

In order to intermittently feed the web of paper 2 to the punching and shearing assemblies, there is provided intermittently operating spaced feed rollers 343 and 344. The feed rollers 343 being mounted upon a shaft 345 extending beyond the assembly and driven through a shaft 346 universally connected thereto. This shaft 346 is driven through a suitable chain drive 347 from a clutch and intermittent driving unit designated B on Fig. 1, but which is similar to that shown in Figs. 11 and 12 for driving the feed rollers 51 and 52. The shaft 345 of the feed roller 343 is provided with a gear 348 in mesh with and driving a similar gear 349 on the driven shaft 351 for the feed rollers 344. The shafts 345 and 351 for the feed rollers have their end bearings 352 and 353 journaled in end brackets 354 (Fig. 18), to which is also secured the bed 338 for the fixed shear blade or knife 276. The end bearings 353 are fixed while the end bearings 352 are spring-loaded at 355 for permitting limited movement to accommodate paper of different thicknesses. Also mounted on and spanning the end brackets 354 is a cross bar 356 upon the rear of which is mounted spaced guides 357 adjustable to accommodate different widths of paper. These end brackets 354 are mounted upon a shelf 358 to the ends of which are secured housing 359 enclosing the driving mechanism for the movable shearing blade 277. A shelf 361 similarly carries end housings 362 which enclose the drive mechanism for the movable punch.

The shelves 358 and 361 and the respective end housings 359 and 362 are vertically adjustable on the ways 318 on the standards 363 to permit the cutting of transverse partition strips of different heights. This adjustment is accomplished by a pair of stationary threaded jack shafts 364, one at each side of the machine, each extending through a vertically aligned, first pierced sprocket 365 and 366. Each end of the end housings 359 ad 362 which support, respectively, the shelves 358 and 361 and which are rotatably moveable relative thereto. A chain 367 extends around each pair of sprockets 365 and 366. Each sprocket 365 and 366 is provided with spaced depressions to receive a spanner wrench or the like, so that rotation of a sprocket 365 or 366 thereby effects rotation of the other sprocket 365 or 366 through the chain 367 and thence through moves the shelf 358 or shelf 361 up or down, depending upon the direction of rotation of the sprockets 365 or 366. Manifestly, other means may be provided for individual vertical adjustment of the shelves 358 and 361.

Fig. 16 discloses adjustment of the side plates 240 whereby to feed transverse partitions 371 of a five instead of a four cell capacity transverse partition 189. To secure such adjustment, the side plates which carry the support or platform 233 and the chain-operated mechanism associated therewith are moved outwardly or to the right, as shown in Fig. 15, an amount sufficient to accommodate a five cell partition.

To adjustably mount the upper end of the connecting rod 82 in the cylindrical housing 77, the upper end 83 is preferably tensionally mounted. Such mounting is shown in Fig. 6 where the rod adjacent its upper end is pinned at 372 or is collapsible on the rod at each side of the collar is a washer 374, and encompassing the rod is a pair of coil springs 375, one end of a coil seating against a bearing 376 secured to the cylindrical housing 77 and the other end seating against a washer 374. The other coil seats against the other washer 374 and the end bearing 377 secured in the housing. The collar 373 is slidable in a sleeve 378 secured in the housing 77. Thus, the upper end of the connecting rod is spring-loaded in the housing 77 for the purpose of taking up any shock due to reversal of direction of the gear segment and the engagement of the segment with the adjustable stops 379.

From the above disclosure and the description in the drawings, it will be appreciated that the present invention comprehends a novel, automatic partition forming or fabricating and assembling machine in which two sets of partitions required for the final assembly are most effectively produced and assembled.

Having thus disclosed the invention, I claim:
1. A partition fabricating and assembling machine, comprising means for feeding thereto a web of paper or the like, means for slotting the web, means for intermittently feeding the web into said slotting means, means
for intermittently cutting the slotted web simultaneously into a set of separate partitions, means for discharging the separate partitions, chutes disposed beneath the cutting means for receiving the discharged partitions, conveying means beneath said chutes for conveying the partitions in spaced relation, means for feeding to the machine a second web of paper or the like, means for slotting said second web, means for intermittently feeding this second web to and from the last mentioned slotting means and into interlocking engagement with the first set of partitions, and means for conveying the last mentioned web to form a partition after the end of said web has been fed and assembled in the first set of partitions.

2. An automatic partition forming and assembling machine comprising means for supplying two webs of paper, means for punching and slotting one of the webs to form a repeat pattern transversely of said web, means for simultaneously shearing a predetermined end portion of said one web along a predetermined number of transverse lines to provide a plurality of substantially identical partitions forming a set thereof, means for successively moving each set of plurality of partitions into and through an assembly zone for the reception of cross partitions formed from the other web, means for punching and slotting the other web, means for feeding the end of the latter punched and slotted web into aligned slots in the plurality of partitions formed from the first mentioned web, and means for shearing the last mentioned web as it is moved into these slots to provide successive partitions interlocking with said first mentioned plurality of partitions.

3. Automatic apparatus for fabricating and completely assembling the transverse and longitudinal partitions for cartons or containers, comprising mechanism for punching, slotting and shearing successive sets of partitions including means for punching and slitting a continuous web of material to form a repeat pattern transversely of said web and means for simultaneously shearing a predetermined end portion of said web along a predetermined number of transverse lines to provide each said set of partitions, mechanism for punching, slotting and shearing successive individual partitions for interlocking engagement with the first set, mechanism for moving said partitions of the first set to and through an assembly zone in timed relation to successively receive the individual partitions, and means for effecting the delivery of the individual partitions successively.

4. An automatic partition forming and assembling machine, mechanism for punching a web of sheet material to provide a plurality of partitions when severed transversely of said web along predetermined lines, mechanism for successively severing the free ends of the punched web transversely thereof to simultaneously provide successive sets of interlocking partitions, mechanism for punching and slitting a second web of sheet material, mechanism for shearing the punched and slitted web to provide transverse interlocking partitions, means for successively conveying the sets with partitions in spaced relation to a position beneath the last mentioned shearing mechanism, and means for feeding the second web to automatically assemble successive transverse partitions with each set to provide a complete partition assembly.

5. In an automatic partition fabricating and assembling machine, two sets of punching and shearing means, feed mechanism for automatically and intermittently feeding a web of sheet material to each set of means, operating mechanism for punching and shearing from one web simultaneously a plurality of partitions forming one set of interlocking partitions for the assembly including means for punching said one web to form a repeat pattern transversely of said web and means for simultaneously shearing a predetermined end portion of said one web along a predetermined number of transverse lines to provide said partition sets, means for conveying this set of partitions to a position beneath the second set of shearing means, means for maintaining said partitions in spaced relation while being thus conveyed, means for aligning the first set of partitions with the second web as it passes between the second set of shearing means so that the partitions from the second web may be forced into interlocking assembly with the slots in the first set, means for feeding the second web through the shearing means and into interlocking engagement with the partition sets, and means for conveying the first set of partitions in timed relation with the shearing of the partitions from the second web.

6. An automatic partition forming and assembling apparatus, comprising mechanism for forming two sets of partitions one of which provides the transverse and the other the longitudinal partitions of an assembly, said partitions being formed from webs of sheet material, said mechanism including means for punching one web to form a repeat pattern transversely thereof and means for repeatedly simultaneously shearing predetermined end portions of said punched web along a plurality of predetermined lines transversely thereof to provide successive sets of partitions, means for positively discharging the partitions after the shearing operation from an initial common horizontal plane into substantially upright spaced parallel planes, means for receiving and conveying said set of partitions in vertical and parallel spaced relation for assembly with the partitions of the second set, punching and shearing means disposed in vertical relation, feed mechanism for intermittently feeding and conveying a web of sheet material to and through the vertically disposed punching and shearing means and into aligned slots in the first set of partitions, and power actuating means for synchronously operating the last mentioned punching and shearing dies whereby to successively shear a partition from the web passing therethrough after said web has entered aligned slots in the first set of partitions, the first set of partitions being conveyed to a position beneath the vertically arranged dies in timed relation with the feeding of the web forming the second set of partitions.

7. An automatic stripper and assembler for forming and assembling two sets of partitions required in a partition assembly providing cells or pockets in a carton or container, comprising two sets of punching and cutting means for receiving punching and cutting a web of sheet material supplied to each set of punching and cutting means, said one set of punching and cutting means being disposed in a generally common horizontal plane, said one set of punching and cutting means including means for punching one web to form a repeat pattern transversely thereof and means for repeatedly simultaneously shearing predetermined end portions of said punched web along a plurality of predetermined lines transversely thereof to provide successive sets of partitions, the other set of punching and cutting means being disposed in vertical alignment for punching and shearing an individual partition of the second set, means for disposing said first set of partitions in substantially vertical spaced apart positions, means for conveying the first set in vertical alignment and spaced apart in the relation they assume in the complete assembly, and means for conveying the web forming the second set of partitions in timed relation with the first set and assembling the individual partitions in slots provided therefor in the first set.

8. In an automatic partition forming and assembling machine comprising, in combination, means for intermittently transversely cutting a predetermined end length of paper boards previously fed through said die punching means simultaneously into a plurality of partition lengths which are transversely disposed relative to said web,
means for intermittently feeding a paper board web successively to and through said die punching means and said cutting means, means for positioning partition lengths cut by said cutting means substantially vertically and in substantially parallel relation, means for feeding cut partition lengths to and through an assembly zone, and means for automatically providing and assembling other partition lengths transversely of cut and parallel positioned partition lengths passing through an assembly zone.

9. In a partition forming and assembling machine comprising, in combination, means for intermittently feeding a paper board web successively to and through said die punching means simultaneously into a plurality of partition lengths which are transversely disposed relative to said web, means for intermittently feeding a paper board web successively to and through said die punching means and said cutting means, means for positioning partition lengths cut by said cutting means substantially vertically and in substantially parallel relation, means for simultaneously pushing a group of simultaneously cut partition lengths to and through an assembly zone, and means for providing and assembling other partition lengths transversely of cut and parallel positioned partition lengths passing through an assembly zone.

10. In a partition forming and assembling machine comprising, in combination, means for intermittently feeding a paper board web successively to and through said die punching means and said cutting means, means for positioning partition lengths cut by said cutting means substantially vertically and in substantially parallel relation, means for simultaneously pushing a group of simultaneously cut partition lengths to and through an assembly zone, and means for providing and assembling other partition lengths transversely of cut and parallel positioned partition lengths passing through an assembly zone.

11. In a partition forming and assembling machine comprising, in combination, means for intermittently feeding a paper board web successively to and through said die punching means and said cutting means, means for positioning partition lengths cut by said cutting means substantially vertically and in substantially parallel relation, means for simultaneously pushing a group of simultaneously cut partition lengths to and through an assembly zone, and means for providing and assembling other partition lengths transversely of cut and parallel positioned partition lengths passing through an assembly zone.

12. In a partition forming and assembling machine comprising, in combination, means for intermittently feeding a paper board web successively to and through said die punching means and said cutting means, means for positioning partition lengths cut by said cutting means substantially vertically and in substantially parallel relation, means for automatically providing and assembling other partition lengths transversely of cut and parallel positioned partition lengths passing through an assembly zone.

13. In a partition forming and assembling machine comprising, in combination, means for intermittently feeding a paper board web successively to and through said die punching means and said cutting means, means for positioning partition lengths cut by said cutting means substantially vertically and in substantially parallel relation, means for simultaneously pushing a group of simultaneously cut partition lengths to and through an assembly zone, and means for providing and assembling other partition lengths transversely of cut and parallel positioned partition lengths passing through an assembly zone.

14. In a partition forming and assembling machine comprising, in combination, means for intermittently feeding a paper board web successively to and through said die punching means and said cutting means, means for positioning partition lengths cut by said cutting means substantially vertically and in substantially parallel relation, means for automatically providing and assembling other partition lengths transversely of cut and parallel positioned partition lengths passing through an assembly zone.

15. In a partition forming and assembling machine comprising, in combination, means for intermittently feeding a paper board web successively to and through said die punching means and said cutting means, means for positioning partition lengths cut by said cutting means substantially vertically and in substantially parallel relation, means for automatically providing and assembling other partition lengths transversely of cut and parallel positioned partition lengths passing through an assembly zone.

16. In a partition forming and assembling machine comprising, in combination, means for intermittently feeding a paper board web successively to and through said die punching means and said cutting means, means for positioning partition lengths cut by said cutting means substantially vertically and in substantially parallel relation, means for automatically providing and assembling other partition lengths transversely of cut and parallel positioned partition lengths passing through an assembly zone.

17. In a partition forming and assembling machine comprising, in combination, means for intermittently feeding a paper board web successively to and through said die punching means and said cutting means, means for positioning partition lengths cut by said cutting means substantially vertically and in substantially parallel relation, means for automatically providing and assembling other partition lengths transversely of cut and parallel positioned partition lengths passing through an assembly zone.

18. In a partition forming and assembling machine comprising, in combination, means for intermittently feeding a paper board web successively to and through said die punching means and said cutting means, means for positioning partition lengths cut by said cutting means substantially vertically and in substantially parallel relation, means for automatically providing and assembling other partition lengths transversely of cut and parallel positioned partition lengths passing through an assembly zone.
partition lengths to the assembly zone and another means for moving each said group of simultaneously cut partition lengths intermittently through the assembly zone, and means for providing and assembling other partition lengths transversely of cut and parallel positioned partition lengths passing through an assembly zone, said another means comprising spring arms and means for successively intermittently engaging said spring arms with each transversely nested partition length.

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