

C. F. SMITH.
PACKAGING MACHINE.

APPLICATION FILED FEB. 28, 1910. RENEWED JUNE 16, 1911.

1,038,010.

Patented Sept. 10, 1912.

10 SHEETS—SHEET 1.

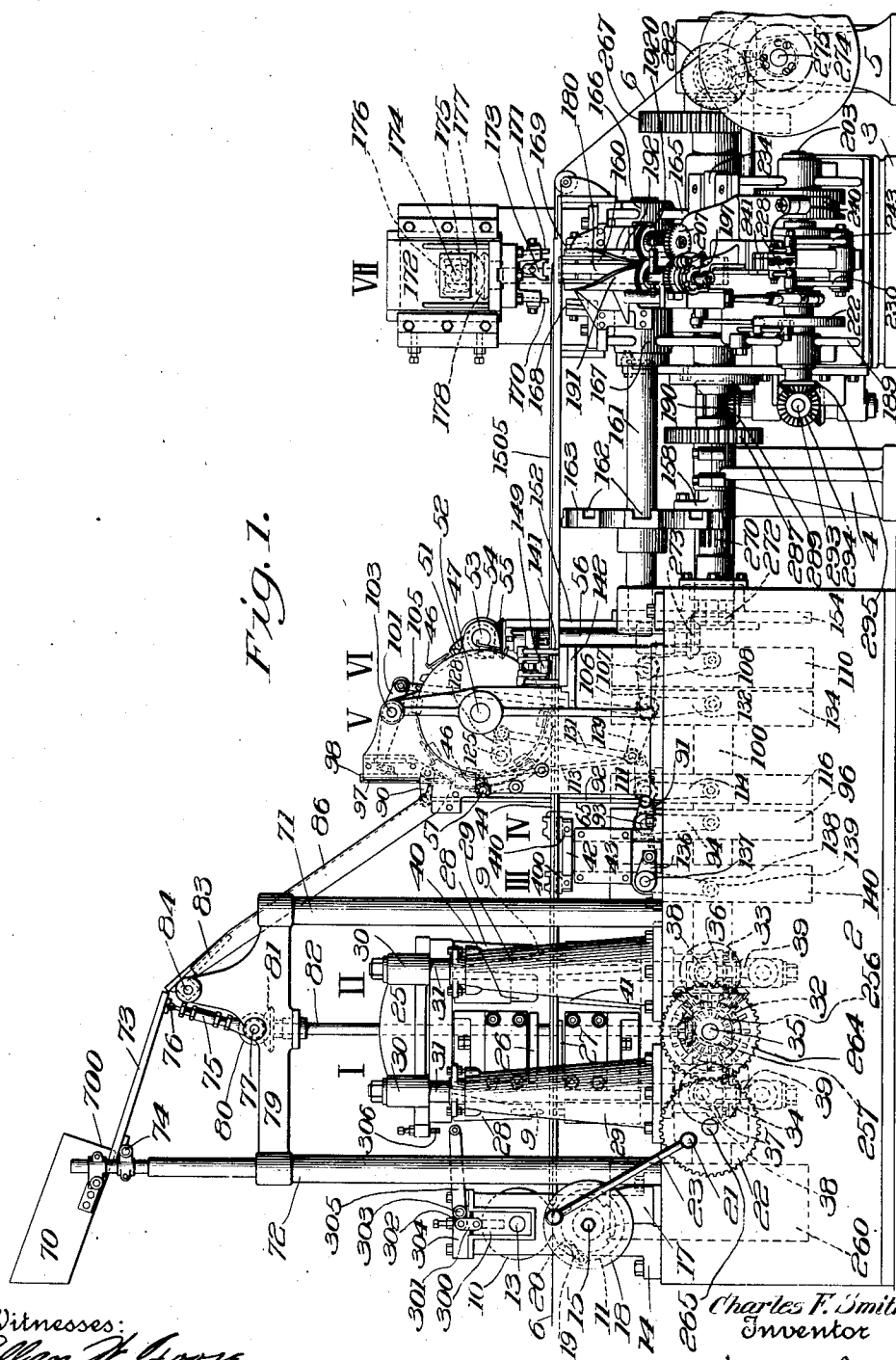


Fig. 1.

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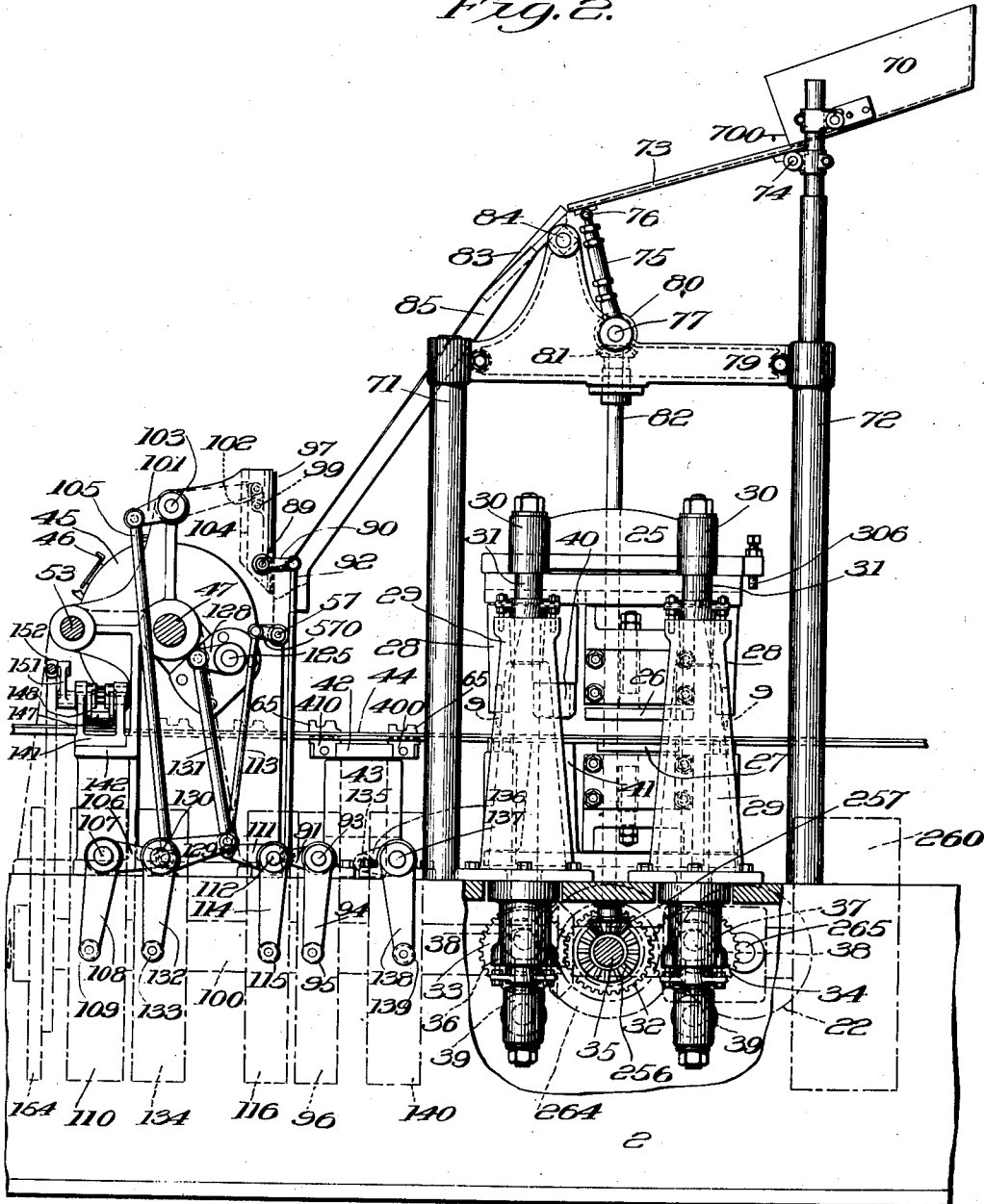
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Fig. 2.



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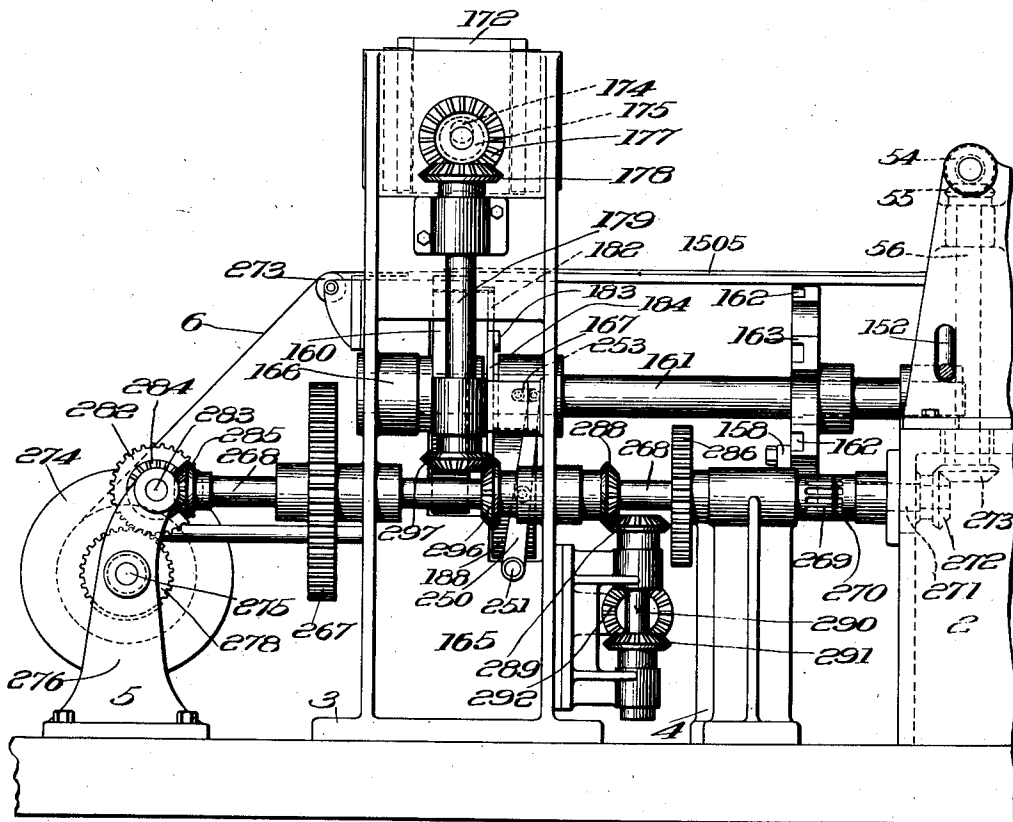
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Fig. 3.



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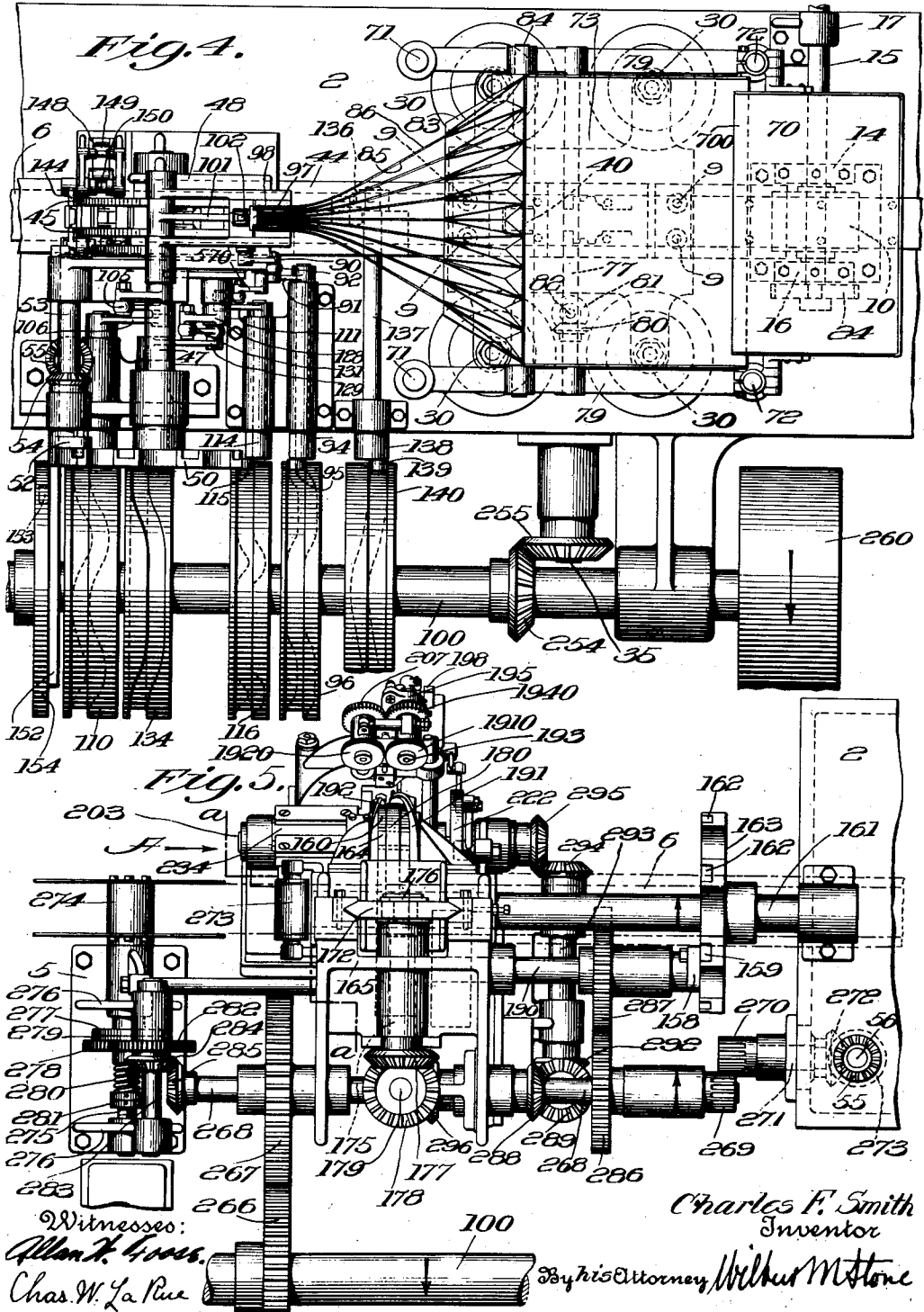
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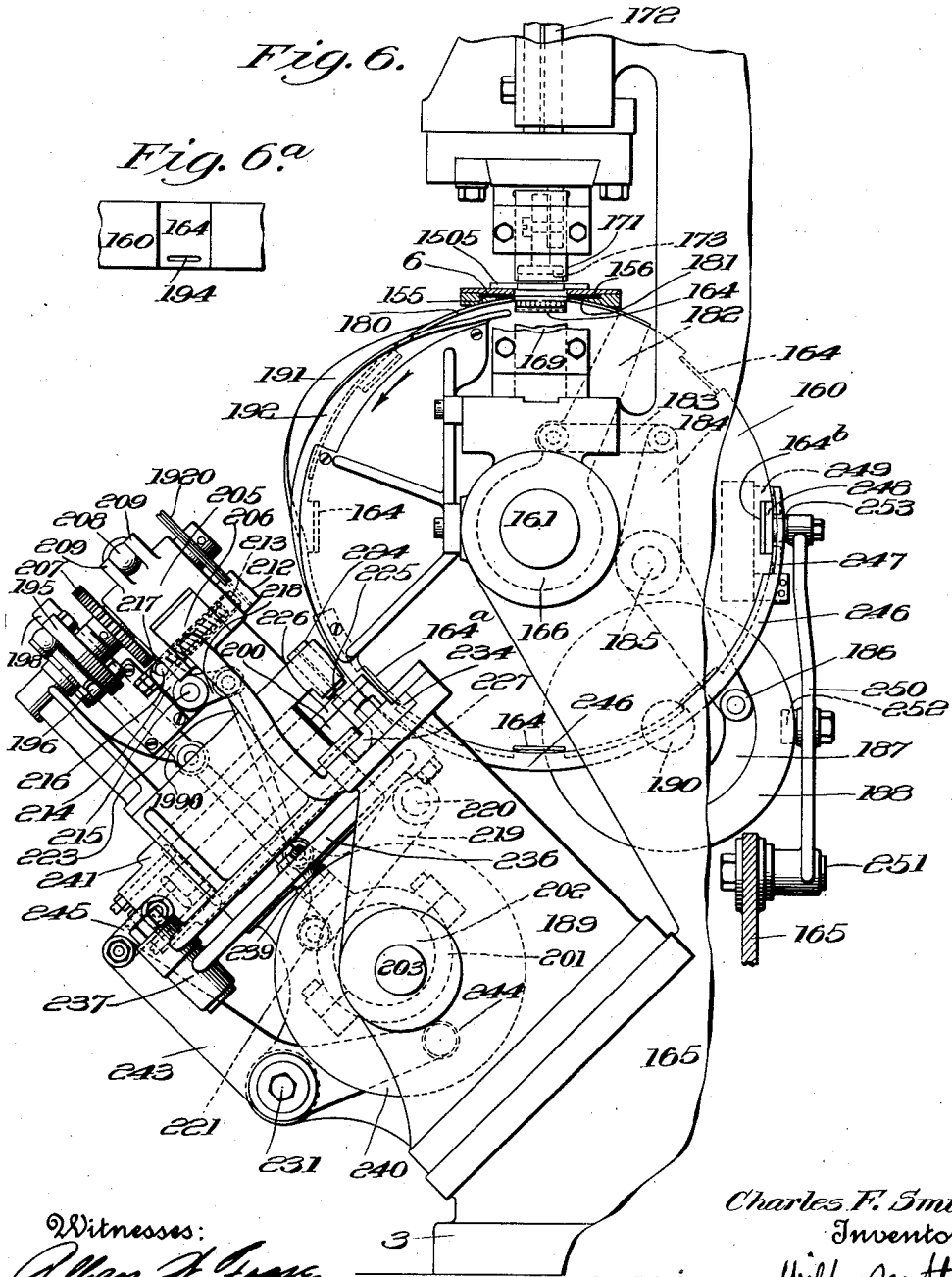
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Fig. 7.

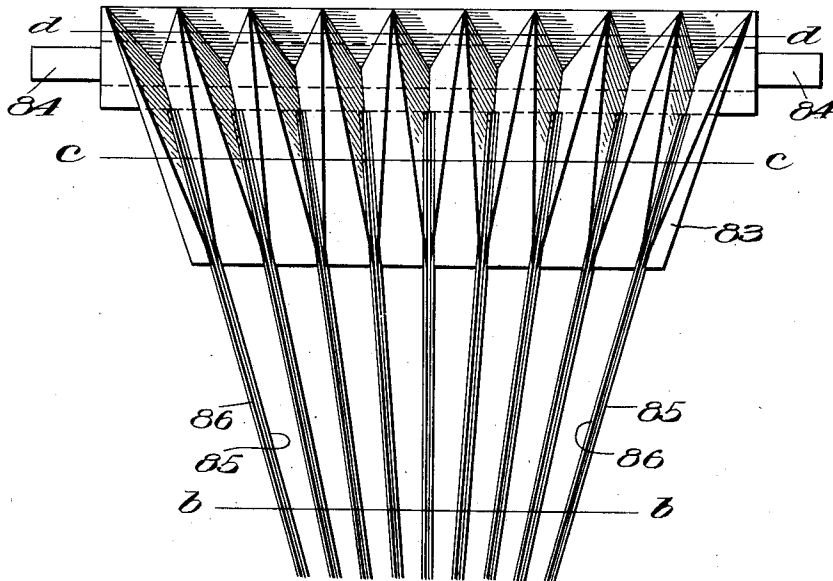


Fig. 8.



Fig. 9.



Fig. 10.



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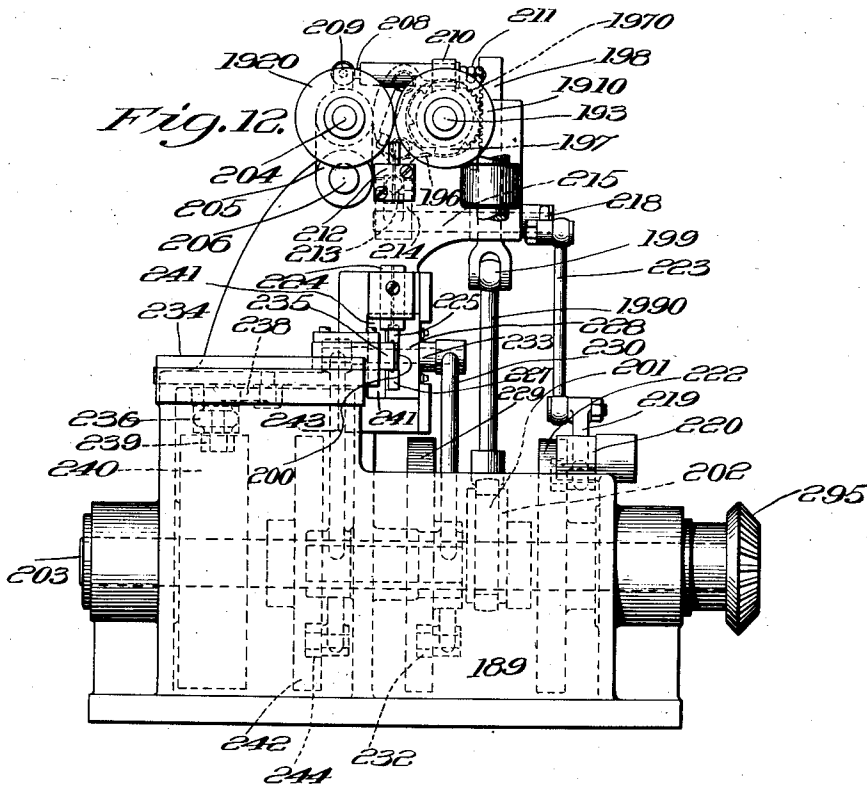
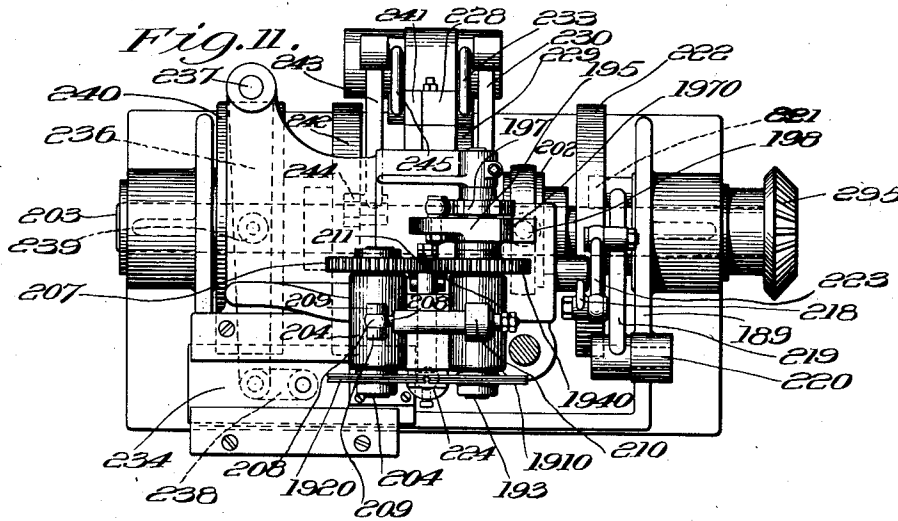
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10 SHEETS—SHEET 7.



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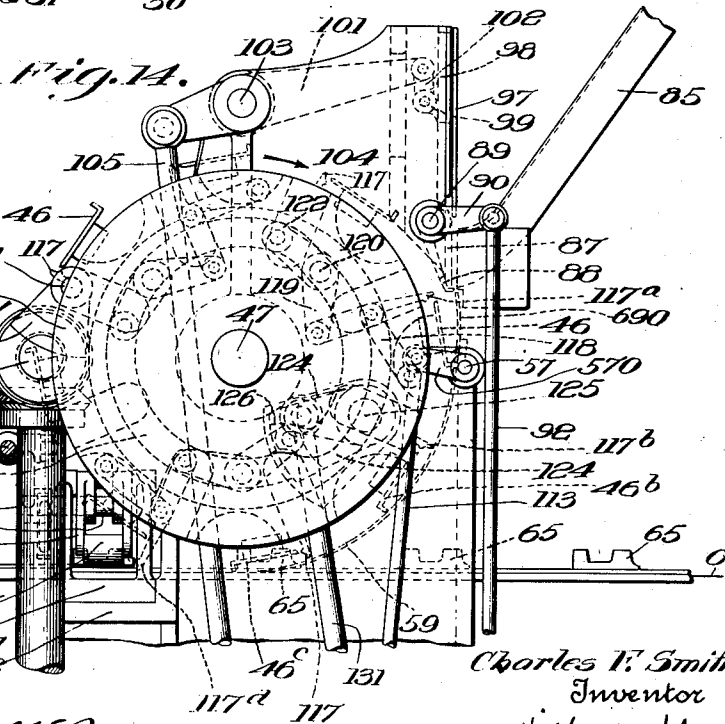
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10 SHEETS—SHEET 8.



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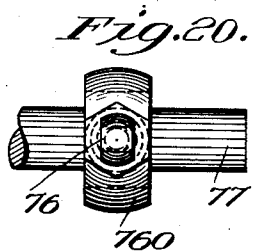
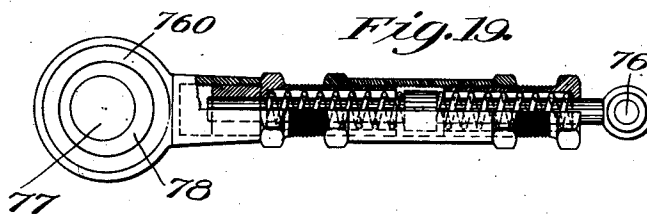
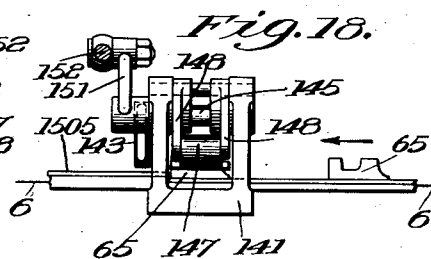
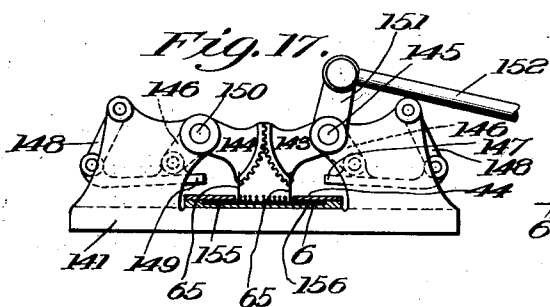
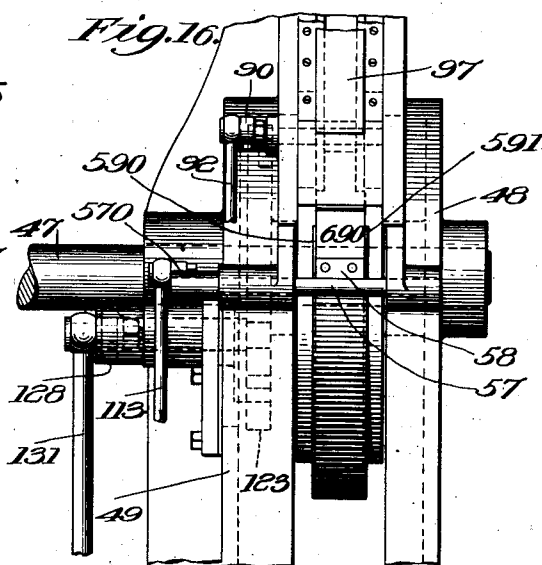
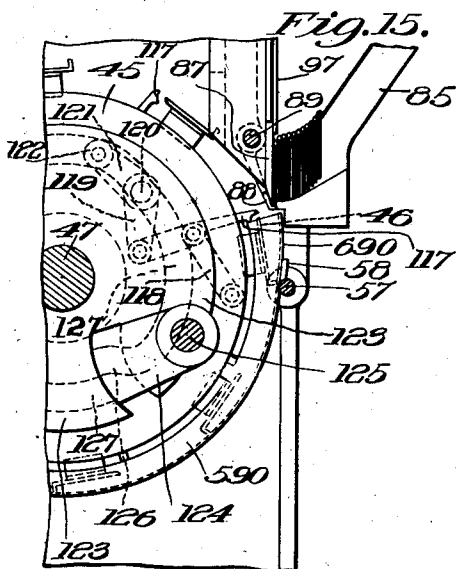
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10 SHEETS—SHEET 9.



Witnesses:
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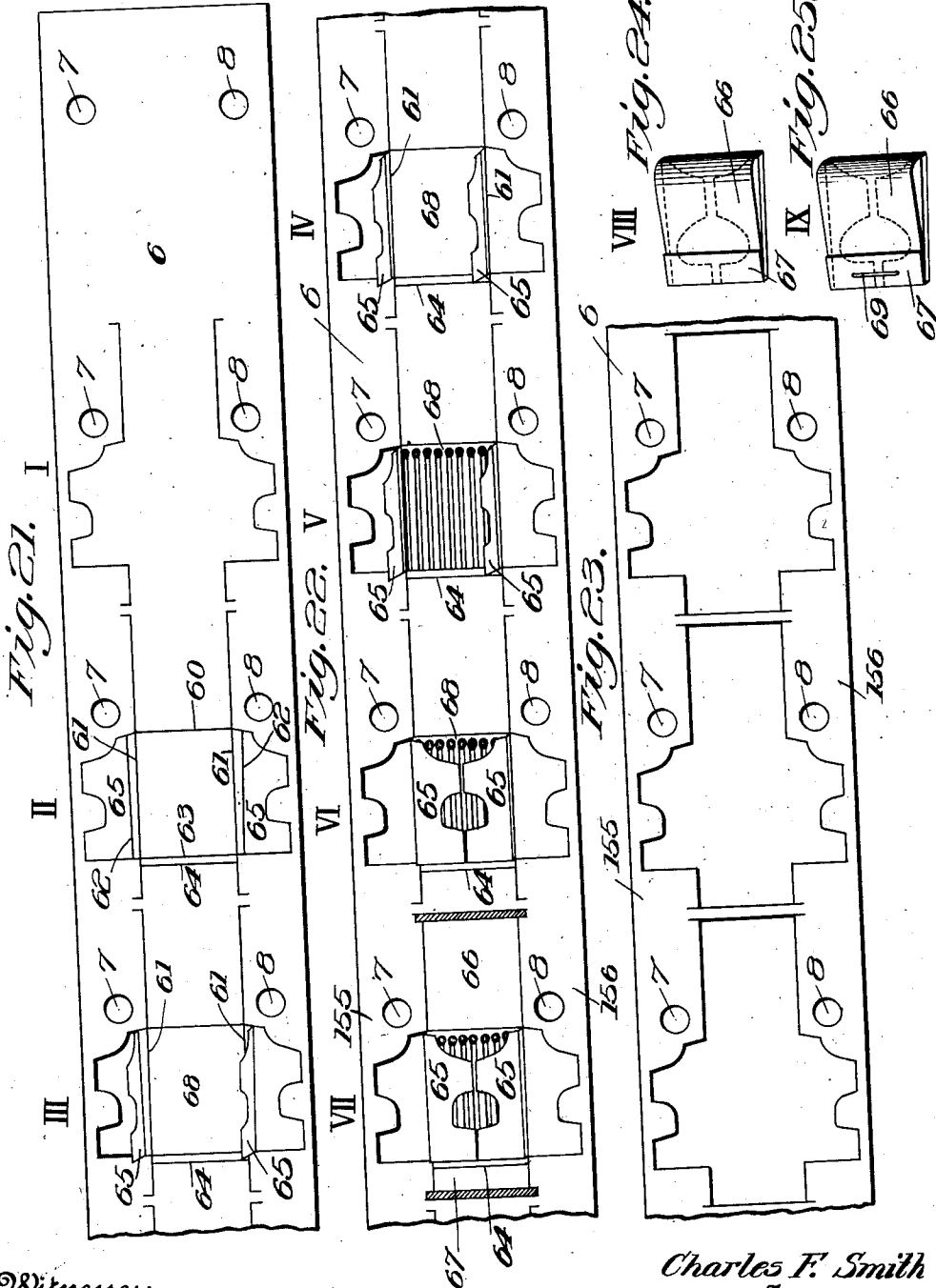
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10 SHEETS—SHEET 10.



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UNITED STATES PATENT OFFICE.

CHARLES F. SMITH, OF BRIDGEPORT, CONNECTICUT, ASSIGNOR TO ANITA SAFETY MATCH COMPANY, A CORPORATION OF NEW YORK.

PACKAGING-MACHINE.

1,038,010.

Specification of Letters Patent.

Patented Sept. 10, 1912.

Application filed February 28, 1910, Serial No. 546,396. Renewed June 16, 1911. Serial No. 633,590.

To all whom it may concern:

Be it known that I, CHARLES F. SMITH, a citizen of the United States, and resident of Bridgeport, in the county of Fairfield and State of Connecticut, have invented certain new and useful Improvements in Packaging-Machines, of which the following is a specification.

This invention relates to packaging machines and particularly to that class thereof which is adapted for forming packages from a continuous web of paper or other suitable sheet material, and for placing in said packages such articles as matches, tooth-picks or the like.

The object of my present improvements is to furnish an automatic machine of the character specified, operable with accuracy at high speeds.

To these ends my improvements comprise mechanisms and combinations illustrated in their preferred forms in the drawings accompanying this specification, wherein—

Figure 1 is a general longitudinal elevation of a packaging machine embodying my improvements. Fig. 2 is an elevation, on an enlarged scale of the left hand portion of the machine as shown in Fig. 1 but viewed from the opposite side. Fig. 3 is an elevation on the same scale as Fig. 2 of the right hand portion of the machine as shown in Fig. 1 but viewed from the opposite side. Fig. 4 is a plan view corresponding with Fig. 2 and Fig. 5 is a plan view corresponding with Fig. 3. Fig. 6 is an end elevation, looking in the direction of arrow A of Fig. 5 and with those parts to the left of line *a, a* in said figure removed. Fig. 6^a is a plan view of a detail of what is shown in Fig. 6. Fig. 7 is an enlarged plan of a portion of Fig. 4. Figs. 8, 9 and 10 are sections on lines *b, b, c, c, d, d* respectively of Fig. 7. Fig. 11 is a plan view of the stapling mechanism and Fig. 12 is a side elevation thereof. Fig. 13 is an enlarged plan view similar to a part of Fig. 4 and Fig. 14 is an elevation thereof. Fig. 15 is a detail of a portion of Fig. 14 and Fig. 16 is an end elevation corresponding therewith. Fig. 17 is a side elevation on an enlarged scale of the side flap folding means and Fig. 18 is an end elevation corresponding therewith. Fig. 19 is an enlarged sectional elevation of a detail of Fig. 2 and Fig. 20 is an end elevation corresponding therewith. Figs. 21

to 25 inclusive are perspective views illustrating the several steps in the operations performed by my improved machine.

Portions of the mechanism of my improved machine are mounted on box-like frame 2 and other portions on base 3 and posts 4 and 5. The web of material 6 from which the match packages are formed is previously provided with gage holes as 7, 7, and 8, 8 equally spaced near the opposite edges respectively thereof. Said holes are for engagement with gage pins as 9 for registering and timing said web with the cutting means and with the several other instrumentalities of my improved machine. Said gage pins 9 have tapered points so as to permit free entrance thereof in gage holes 7, 7, 9, 9 and as said pins pass downwardly through said holes of web 6 any deviation in register or timing of said web is corrected. Feed rolls 10, 11 are mounted on parallel shafts 13, 15 respectively in up-rights 14, 16 and lower shaft 15 is also supported in outboard bearing 17 adjacent to disk 18 turning freely on said shaft. Pawl 19 is pivoted to said disk for engagement with ratchet 20 fixed to shaft 15. Disk 18 is oscillated on its axial shaft 15 from crank pin 21 on gear 22 through connecting rod 23. Shafts 13, 15 are geared together (see gear 24, Fig. 4) to cause rolls 10, 11 to operate in rolling coaction for intermittently advancing web 6 in predetermined increments.

Blanking mechanism, I.—For cutting the side profiles (I, Fig. 22) of the package a vertically reciprocating head 25 has mounted on the under side thereof punch 26 for coaction with die 27. Said head 25 has downwardly reaching posts as 28 carrying gage pins as 9 for engagement with holes as 7, 8 of web 6. To permit said gage pins 9 to effect the registry of web 6 by engagement with holes as 7, 8 therein the web must be free to go and come endwise at the time of the engagement of said pins therewith. This freedom is attained as follows: Shaft 13 of upper feed roll 10 is mounted in vertically slidable boxes as 300 having links as 301 connecting them with arms, as 302, fixed to shaft 303 having bearings in the top caps as 304 of boxes as 300. Fixed to said shaft 303 is arm 305 the free end of which lies under screw 306 adjustably fixed in an ear of reciprocating head 25. Head 25 is actuated to cause punch 26 to coact with die

27 by the following means. Extending downwardly from ears as 30 of said head are plungers as 31 slidably mounted in bearings as 29 upstanding from frame 2. Shaft 35 having bearings in said frame 2 has gear 32 fixed thereon driving gear 33 on shaft 36 on one side and gear 34 on shaft 37 on the other side. Said shafts 36 and 37 have eccentrics as 38 thereon connected by links as 39 to said plungers as 31 for imparting vertical reciprocatory motion thereto.

Creasing mechanism, II.—Adjacent to punch 26 on head 25 is fixed creaser 40 for coaction with bed 41 for forming creases as 60, 61 to define the folding lines of the package. Said creaser 40 in coaction with bed 41 forms a total of seven creases, to wit: opposite creases 61, 61 along which the first folds of side flaps 65, 65 are made; creases 62, 62 along which the second folds of said side flaps are made; creases 63, 64 along which the first and second folds respectively of short end flap 67 are made and crease 60 along which the fold of the long end flap 66 is made.

Preliminary side flap folding, III, IV.—The preliminary folding of side flaps 65, 65 along lines 62, 62 and then along lines 61, 61 is performed by blades 400 and 410 respectively on plunger 42 slidably mounted in bearing 43 upstanding from frame 2. Said blades 400 and 410 press the side flaps upwardly against the edges of top plate 44 and which plate prevents said side flaps from being folded over so far as to prevent the later reception of the matches therebetween. Slide 42 has its lower portion in engagement with roll 135 of arm 136 fixed to rock shaft 137. Arm 138 also fixed to said rock shaft has roll 139 thereof in engagement with cam 140 on shaft 100.

Match gathering and delivering mechanism, V.—Directing attention now to the means for gathering and delivering the matches to the package, four posts as 71, 72 are supported from frame 2. Posts 72 are of greater height than posts 71, and have hopper 70 fixed to the upper ends thereof. Said hopper 70 has its open front 700 facing and overhanging joggle table 73 pivoted at 74 to posts 72. The delivery end of said table 73 is supported by joggle arms 75 pivoted at 76 to said table and at 760 to eccentric portions 78 of shaft 77. Said joggle arms are spring cushioned as fully illustrated in Fig. 17. Shaft 77 has bearings in frames 79 fixed to posts 71, 72 and has bevel gear 80 fixed thereon for engagement with bevel gear 81 on vertical shaft 82. Guide frame 83 is pivoted at 84 to frames 79 and has a series of chutes comprising pairs of rails as 85, 86 converging toward that holder, as 46, of revoluble carrier 45, in position to receive its charge of matches (Fig. 13). Each pair of rails as 85, 86 are parallel with

each other and are spaced apart sufficiently to allow free passage for the match stick but are near enough together to prevent the match head from falling therebetween. Stop-plate 87 receives the leading matches in the several chutes thereagainst and at said point of delivery the space between adjacent rails as 85, 86 is enlarged to allow the passage downward of the match heads. Stop 88 fixed to shaft 89 is provided to support the matches at said point of delivery (Fig. 13). Said shaft 89 has crank arm 90 fixed thereto and is operably connected to arm 91 by rod 92. Said arm 91 is fixed to rock shaft 93 having arm 94 also fixed thereto. Said arm 94 carries roll 95 for engagement with cam 96 on main shaft 100. For forcing the row of matches lying against stop plate 87 downwardly into holder 46, plunger 97 is provided. Said plunger is fixed to slide 98 having ears as 99 thereof connected to arm 101 by link 102. Said arm is fixed to shaft 103 having bearings in the upper part of carrier frame 104. Said arm 101 has its outboard end operably connected with arm 106 fixed to rock shaft 107 by rod 105. Arm 108 also fixed to shaft 107 has roll 109 thereof in engagement with cam 110 of shaft 100. For retaining the matches sidewise in the holders as 46 fixed side plates 590, 591 are provided. For pressing the row of matches into position in holder 46 the upper part 690 of curved front guide 59 is fixed to ear 58 of shaft 57. Arm 570 of said shaft 57 is operably connected to arm 111 fixed to rock shaft 112 by means of rod 113. Arm 114 also fixed to rock shaft 112 has roll 115 thereof in engagement with cam 116 of shaft 100. The contours of cams 95, 110 and 116 are such as to cause stop 88, plunger 97 and guide part 690 respectively to coact to bring down two successive rows of matches into each holder of carrier 45 while said holder is in receiving position.

Revoluble carrier 45 comprises two disk like members between which a plurality of holders as 46 are supported. Said carrier 45 is fixed to shaft 47 having bearings in side frames 48, 49. Slotted disk 50 is fixed to the outboard end of said shaft 47 and is intermittently rotated by pin 51 of crank arm 52 fixed to shaft 53. Bevel gear 54 fixed to shaft 53 is driven by bevel gear 55 fixed to vertical shaft 56. For retaining the matches in the holder rear gate 117 is pivoted midway its length to one end of link 118. The other end of said link is pivoted near the periphery of carrier 45. The inner end of said rear gate 117 is pivoted to arm 119 fixed to rock shaft 120 having bearings in said carrier. Arm 121, also fixed to rock shaft 120 has roll 122 thereof in engagement with fixed cam 123 mounted coaxial with carrier 45. Said cam has portion 126 of its path formed in block 124 fixed to shaft 125

for oscillation therewith. Cam path 126 in said block is of such contour that when said block is swung to its upper position (Fig. 15) the receiving end of said path is in coincidence with fixed portion 127 of the path in cam 123 and when said block 124 is swung to its lower position the delivery end of its path 126 is in coincidence with said fixed path 127. Shaft 125 has arm 128 fixed thereto and said arm is operably connected with arm 129 fixed to rock shaft 130 by rod 131. Arm 132 also fixed to shaft 130 has roll 133 thereof in engagement with cam 134 of shaft 100.

15 *Side flap folding mechanism, VI.*—Pivotal-ly mounted in frame 141, (Figs. 17, 18) fixed to bracket 142 of frame 48 are meshing segment gears 143, 144. To pivotal shaft 145 of gear 143, are fixed links 146, 146 and
20 between the free ends of said links the inner end of side folder 147 is pivoted. The rear end of said folder 147 is pivoted to the lower ends of links 148 and the upper ends of said links are pivoted to said frame 141. Side
25 folder 147 is adapted to swing inwardly and downwardly to fold one of side flaps 65 over and down upon the matches. Side flap folder 149 is similarly mounted at the op-
30 posite side for similar engagement with the other side flap 65. Rocking motion is transmitted to shaft 145 and through segment gears 143, 144 to shaft 150 through arm 151 fixed to shaft 145 and cam rod 152 having
35 roll 153 thereon for engagement with cam 154 on shaft 100. Side flaps 65, 65 are maintained in upright positions after their preliminary folding, III, IV, by the inner edges of web top guides 155, 156 (Fig. 17). Top plate 1505 is provided to retain said
40 flaps 65, 65 in their final folded position, VI, after passing from under folders 147, 149.

End flap severing and folding, VII, VIII.—A second revoluble carrier 160 fixed to a shaft 161 is intermittently rotated by
45 means of crank 158 having pin 159 thereof for engagement with radial slots 162 of disk 163 fixed to said shaft 161 and is provided with holders as 164 for receiving the pack-
50 ages, one by one, as their end flaps are severed from the web. Said carrier shaft 161 is arranged parallel to the direction of travel of the web and the path of travel of said web is directly across and closely contiguous to the periphery of said carrier and the
55 intermittent rotation of said carrier presents said holders, as 164, successively in receiving position as described. Frame 165 is mounted on frame 3 and has bearings 166, 167 for
60 shaft 161. Upstanding from said bearings 166, 167 are lower fixed cutters 168, 169 for engagement with cutters 170, 171 respectively, mounted on slide 172 for vertical reciprocation. Between cutters 170, 171 and
65 fixed to slide 172 is pusher 173 for pushing the package out of the web as the end flaps

of said package are severed therefrom and for forcing said package in that holder, as 164 then in receiving position at the top of carrier 160 directly under the severed pack-
age. Slide 172 is actuated by eccentric pin 70 174 of shaft 175 in engagement with block 176 of said slide. Shaft 175 has bevel gear 177 fixed to the outboard end thereof for engagement with bevel gear 178 on the upper
75 end of vertical shaft 179. For retaining the match package in the holder, as 164, and preventing the side flaps from opening after pusher 173 has been retracted and until said package passes under fixed guide 180, mov-
80 able blade 181 fixed to the free end of arm 182 pivoted on shaft 161 is provided. Said blade 181 conforms to the contour of carrier 160 and swings closely thereover. Arm 182 is operably connected to arm 184 by link
85 183. Said arm 184 is pivoted at 185 and has roll 186 in its lower end for engagement with cam slot 187 in the face of cam 188. Said cam 188 is fixed to crank shaft 190.

For folding end flaps 66, 67 fixed tucker plates 191, 192 have contours similar to the
90 mold board of a plow but said contours are arranged relative to a circle so as to turn said flaps over and inwardly as the package passes in a curved path to the left and down-
95 wardly (Fig. 6) in the holder, as 164, in carrier 160. Tucker plate 191 operates upon long flap 66 and folds it down in advance of the folding of flap 67 by tucker plate 192 whereby said short flap 67 overlaps said
100 long flap 66 and retains it in position.

Flap fastening mechanism, IX.—Short end flap 67 may be secured to side flaps 65, 65 by any one of several means but I prefer to employ wire staples 69 therefor (Fig. 25). Said staple is formed from a continuous
105 wire which may be stored on a convenient reel, not shown, and fed by means of rolls 1910, 1920 to cutting, forming and setting mechanism. Said staple making and setting
110 mechanism is conveniently mounted on frame 189 fixed to frame 165 at such an angle as to permit staple setting plunger 200 to reciprocate normal to holder, as 164, of carrier 160 when said holder has reached a
115 position in its circular path of travel beyond tucker plates 191, 192 and end flaps 66, 67 have been folded by said tucker plates. Each holder as 164 has a die as 194 (Fig. 6^a) formed therein for turning over the points
120 of staple 69 after said staple has been successively forced through end flap 67, side flaps 65, 65 and back 68 of the package. Feed roll 1910 is fixed to shaft 193 having bearings in the upper portion of frame 189
125 and gear 1940 is also fixed to said shaft. Arm 195 mounted freely on shaft 193 has spring urged pawl 196 pivoted thereon for engagement with ratchet 197 fixed to said shaft. Arm 195 has gear teeth 1970 formed
130 in the hub thereof for engagement with rack

198 slidably mounted in frame 189. Said rack 198 is pivotally connected at 199 to pitman 1990 of strop 201 of eccentric 202 fixed on shaft 203 having bearings in the lower portion of frame 189. Feed roll 1920 is fixed to shaft 204 having a bearing in swinging arm 205 pivoted at 206 in said frame 189. Gear 207 is fixed to shaft 204 for engagement with gear 1940 of roll shaft 193. Roll 1920 is urged to engagement with roll 1910 by spring cushioned pull rod 208 pivoted at one end between ears 209, 209 of arm 205 and at the other end engaged by ear 210 on top of frame 189. Tension may be varied by lock nuts 211. For straightening the wire as it is fed downwardly by rolls 1910, 1920 guide 212 having hammer 213 therein is provided. Said hammer is spring cushioned and is actuated by arm 214 fixed to shaft 215 in frame 189 and in engagement with studs as 216 of yoke 217 on the shank of hammer 213. Shaft 215 also has arm 218 fixed thereto and said arm is operably connected to arm 219 pivoted at 220 and having roll 221 thereof in engagement with cam 222, by link 223. The wire then passes downwardly through guide 224 the lower face of which acts as one member of a pair of shears for cutting the wire into predetermined lengths for staples. The other member of said shears is the leading end 225 of upper forming plunger 226. Said plunger 226 and lower forming plunger 227 are adjustably fixed in slide 228 having bearings in frame 189. Slide 228 is actuated from cam 229 on shaft 203 by means of arm 230 pivoted at 231 in frame 189 and having roll 232 in the lower end of said arm in engagement with said cam and having link 233 connecting the upper end of said arm with said slide 228.

On the forward end of cross slide 234 is mounted anvil 235 around which the staple is formed by upper and lower plungers 226, 227. Said slide 234 is actuated to alternately move anvil 235 into operable position and to withdraw it to allow setting plunger 200 to operate, by means of arm 236 pivoted at 237 in frame 189. Said arm is operably connected with said slide by link 238 and has roll 239 thereof in engagement with cam 240. Staple setting plunger 200 is adjustably mounted in slide 241 having bearings beside slide 228 in frame 189. Said slide 241 is actuated from cam 242 on shaft 203 by means of arm 243 pivoted on shaft 231 and having roll 244 in the lower end of said arm in engagement with said cam and having link 245 connecting the upper end of said arm with said slide 241.

Ejecting mechanism.—Guide 246 is provided to retain the package in the holder, as 164 for delivery in front of ejector 248. Said guide 246 is cut away at 247 to allow said ejector to discharge the package from

the holder. Said ejector is slidably mounted in bearing 249 in a web of frame 165 and is actuated from cam 188 by means of arm 250 pivoted at 251 and having roll 252 in engagement with said cam. The upper end of said arm is operably connected with ejector 248 by link 253.

Waste gatherer.—After end flaps 66, 67 have been severed from the web said web passes onwardly over roller 273 to reel 274 on which it is wound under tension. Said reel is fixed to shaft 275 having bearings in brackets 276. Disk 277 is fixed to and gear 278 turns freely upon said shaft. Friction disk 279 is mounted between gear disk 277 and gear 278 and said gear is urged thereagainst by spring 280 and nuts 281. Gear 278 is driven by gear 282 fixed to shaft 283 having bearings in said frame 276. Bevel gear 284 also fixed to shaft 283 is driven by bevel gear 285 on shaft 268.

Driving mechanism.—Power is communicated to pulley 260 on main shaft 100 of my improved machine from some suitable source by the usual belt not shown. Bevel gear 254 on said main shaft drives bevel gear 255 on cross shaft 35. Said cross shaft 35 has bevel gear 256 fixed thereon driving bevel gear 257 on vertical shaft 82. Gear 264 on cross shaft 35 drives gear 22 on stud 265. Gear 266 on main shaft 100 drives gear 267 on shaft 268. Gear 269 on shaft 268 drives gear 270 on short shaft 271 on the inner end of which is bevel gear 272 driving bevel gear 273 on the lower end of vertical shaft 56. Gear 286 on shaft 268 drives gear 287 on crank shaft 190. Bevel gear 288 on shaft 268 drives bevel gear 289 on vertical shaft 290 and bevel gear 291 on said vertical shaft drives bevel gear 292 on one end of transverse shaft 293. On the other end of said transverse shaft bevel gear 294 drives bevel gear 295 on shaft 203 of the stapling mechanism. Gear 296 on shaft 268 drives bevel gear 297 on vertical shaft 179.

Operation.—Pulley 260 on main shaft 100 being revolved in the direction of its arrow joggle arms 75 are set in motion to joggle the matches downwardly on table 73 and into the chutes formed by rails as 85, 86 where they hang suspended by their heads and slide downwardly into position under plunger 97. Said plunger then pushes downwardly a row of matches, stop 88 swinging back to allow the matches to descend, and into holder, as 46 in receiving position thereunder. Upper part 690 of guide 59 then swings inwardly and presses the row of matches into said holder. Plunger 97 has in the meantime returned to its upper position and stop 88 to its place to receive another row of matches. Plunger 97 again descends pushing another row of matches into the holder, stop 88 and part 130

690 of guide 59 operating as before. Carrier 45 is now revolved one increment and holder 46 containing two rows of matches passes downwardly in guide 59. During said movement of carrier 45 rear gate 117 moves from position 117^a to 117^b Fig. 14 relative to the holder thus retaining the matches in said holder. The holderful of matches is now ready for delivery to the package, and which delivery is made during the next two incremental movements of the carrier as hereinafter more fully described.

Attention is now directed to the earlier portions of the package forming mechanism. Lever 305 being depressed by hand, web 6 is passed forwardly between rolls 10, 11 and holes as 7, 8 therein located below gage pins 9. Lever 305 is then released and by the intermittent rotation of rolls 10, 11 said web is fed forwardly one increment of length. Head 25 now descends, pins 9 enter holes as 7, 8 in the web, screw 306 engages lever 305 and lifts top roll 10 from the web; head 25 continues its descent, pins 9 locate the web and punch 26 coacts with die 27 to cut the side profiles, I, in the web. Head 25 is then withdrawn, the web fed forward another increment, registered and cut; at the same time creaser 40 coacts with bed 41 to crease the blank, II, partly punched in the immediately preceding down stroke of head 25. The machine now repeats its described operations and at the second cycle thereof the web has been advanced two increments and the cut and creased blank arrives over folding blades 400. Said blades thereupon rise (coincident with the operation of punch 26, I, and of creaser 40, II) and turn up side flaps 65, 65 on creased lines 62, 62. At the next incremental movement of web 6 the partly folded blank is positioned over blades 410, which thereupon rise and fold the blank along creased lines 61, 61, III, and partially unfold said blank along lines 62, 62. Said operation of blades 410 is coincident with the operation of punch 26, I, creaser 40, II, and blades 410 III. Continuing its described operations the machine now advances the web two successive increments and delivers the first punched and now partly folded blank to a station directly below carrier 45, (Fig. 15). During the second of the two incremental movements just referred to carrier 45 advances holder 46 from position 46^a to position 46^b directly over the partly folded package in the web and with the matches in said holder lying partly in the packages and partly on the lower end of guard 59. At the next incremental movement the matches pass entirely off the end of said guard 59 and are deposited by gravity between side flaps 65, 65 of the package. Holder 46 passes upwardly and away from the matches and rear gate 117,

by means of roll 122 in cam path 126 of block 124 (and which block is swung downwardly just before said roll 122 reaches the lower end of said cam path 126 therein) is moved to position 117^a having followed the matches and retained them in position relative to the package. Said package with the matches therein now lies between side folders 147, 149. Said folders thereupon move downwardly and inwardly toward each other transverse to the web direction and engage side flaps 65, 65 and fold them down onto the matches, VI., (Fig. 17). Said operation of side folders 147, 149 is coincident with the operation of blades 410, 400, with creaser 40 and punch 26. The match filled package with closed side flaps now passes from under folders 147, 149 and in under top plate 1505 and thence by a succession of incremental movements into register with end flap cutters 170, 171 and directly over holder 164 of secondary carrier 160. Said cutters 170, 171 now descend in coaction with fixed cutters 168, 169 respectively and sever the end flaps 66, 67 respectively, from the web VII, whereby the match package is entirely freed of connection with the web. Coincident with the cutting just described pusher 173 presses the severed package into holder 164. Said operations of cutters 170, 171 and pusher 173 are coincident with the operations of side folders 147, 149, blades 410, 400, creaser 40 and punch 26. While the match package is held in holder 164 by pusher 173 blade 181 is advanced over said package between the feet of said pusher 173 thereby holding side flaps 65, 65 closed and the package in position in said holder after said pusher is withdrawn. At the next incremental movement of carrier 160 the package is advanced under fixed guide 180 and end flaps 66, 67 are folded upwardly by fixed folders 191, 192 respectively. Said advancement of the package is continued through two more increments of movement of carrier 160, during which the folding of end flaps 66, 67 is completed, VIII, with short flap 67 overlying long flap 66, and at the end of which two incremental movements the package in carrier 160 has reached position 164^a for coaction with the stapling mechanism. Directing attention now to said stapling mechanism the operation thereof is as follows: Suitable wire being delivered downwardly to the bite of rolls 1910, 1920 said wire is fed, in increments each of suitable length to form one staple, by the intermittent action of pawl 196 in engagement with ratchet 197. Said wire passes downwardly through guide 212 where hammer 213 impinges thereupon and straightens it. The wire then passes into and through guide 224 and downwardly a sufficient distance to deliver a staple length of wire projecting from said

guide. The leading end 225 of plunger 226 then moves forward and coacts with the lower face of guide 224 to shear off the downwardly projecting portion of wire. Said upper forming plunger 226 continues its forward movement synchronously with lower forming plunger 227, they both being fixed to slide 228, and fold the upper and lower ends respectively of said severed portion of wire about anvil 235 of cross slide 234 which has previously been moved forward into position for coaction with said plungers 226, 227. Slide 234 and anvil 235 are now withdrawn and setting plunger 200 on slide 241 advances and forces the legs of the staple into and through short end flap 67, then one leg of the staple through one side flap 65 and the other leg through the other side flap 65 and then both legs of said staple through back 68 and into die 194 of holder 164 where the points of said staple are turned inwardly toward each other and folded down against the outside of said back 68, IX, thereby completing the package. The completed package is now conducted in its holder through several incremental movements of carrier 160 to position 164^b where it is engaged by ejector 248 and discharged from the machine. The operation of ejector 248 is synchronous with the operations of staple setting plunger 200, end flap cutters 170, 171, pusher 173, side folders 147, 149, blades 410, 400, creaser 40, punch 26, gage pins 9, and roll lifting lever 305.

I claim:—

1. A match packaging machine including in combination, means for intermittently advancing a web of material, means for cutting the side profiles in the web between consecutive intermittent advancements of said web, means for placing a plurality of matches between the side flaps during the advancement of said web, means for folding the side flaps, means for severing the end flaps from the web, means for folding the end flaps and means for fastening one end flap to the side flaps.

2. A match packaging machine including in combination, means for intermittently advancing a web of material, means for cutting the side profiles in the web between consecutive intermittent advancements of said web, means for folding the side flaps normal to the web, means for placing a plurality of matches between the side flaps during the advancement of the web and means for folding the side flaps onto the matches, all during the maintenance of the integrity of the package with the web, and means for completing the package.

3. A match packaging machine including in combination, means for intermittently advancing a web of material and the following instrumentalities serially arranged and simultaneously operable between consecu-

tive intermittent advancements of said web: means for cutting the side profiles in the web, means for folding the side flaps onto the matches, means for severing the end flaps from the web and means for fastening one end flap to the side flaps, and means operable during the advancement of the web for placing a plurality of matches between the side flaps.

4. A match packaging machine including in combination, means for intermittently advancing a web of material and the following instrumentalities serially arranged and simultaneously operable between consecutive intermittent advancements of said web: means for cutting the side profiles in the web, means for folding the side flaps onto the matches, means for severing the end flaps from the web and means for fastening the short end flap to the side flaps; and the following instrumentalities simultaneously operable during the advancement of the web; means, located between the side profile cutting means and the side flap folding means for placing a plurality of matches between the side flaps and means, located between the end flaps severing means and the flap fastening means, for folding the end flaps.

5. A match packaging machine including in combination, means for intermittently advancing a web of material, the following instrumentalities serially arranged and simultaneously operable between consecutive intermittent advancements of said web: means for cutting the side profiles in the web, means for registering the web with said cutting means, means for forming two pairs of approximately parallel creases lengthwise the blank, means for folding the side flaps upwardly normal to the web along the outer pair of creases, means for folding the side flaps upwardly normal to the web along the inner pair of creases, means for folding the side flaps onto the matches, means for severing the end flaps from the web, means for delivering the severed package to the revoluble carrier, means for fastening the short end flap to the side flaps and means for ejecting the package from the carrier; and the following instrumentalities simultaneously operable during the advancement of the web: means, located between the means for folding the side flaps normal to the web and the means for folding said side flaps onto the matches, for delivering a plurality of matches between said side flaps and a revoluble carrier, located between the end flap severing means and the flap fastening means, for conducting the package in a direction transverse to the direction of travel of the web and means for coaction with said carrier for folding the end flaps.

6. A match packaging machine including in combination, a pair of intermittently

operable feed rolls for delivering the web to the machine and continuously operable web tension means at the discharge end of the machine, means for cutting the side profiles in the web, means for placing a plurality of matches between the side flaps, means for folding the side flaps onto the matches, means for severing the end flaps from the web, means for folding the end flaps and means for fastening one end flap to the side flaps.

7. A match packaging machine including in combination, means for advancing a web of material, means for cutting the side profiles in the web, a revoluble carrier having a plurality of holders, means for intermittently revolving said carrier, means for delivering a predetermined number of matches successively to each holder, means for delivering the matches from the holder to between the side flaps, means for folding the side flaps onto the matches, means for severing the end flaps from the web, means for folding the end flaps and means for fastening one end flap to the side flaps.

8. A match packaging machine including in combination, means for advancing a web of material, means for cutting the side profiles in the web, a revoluble carrier having a plurality of holders, means for intermittently revolving said carrier, means for delivering a predetermined number of matches successively to each holder, fixed means for retaining the matches in the holder, means mounted on the carrier for advancing and delivering said matches between the side flaps, means for folding the side flaps onto the matches, means for severing the end flaps from the web, means for folding the end flaps and means for fastening one end flap to the side flaps.

9. A match packaging machine including in combination, means for advancing a web of material, means for cutting the side profiles in the web, a revoluble carrier having a plurality of holders, means for intermittently revolving said carrier, means for delivering a predetermined number of matches successively to each holder, fixed means for retaining the matches in the holder, a rear gate movably mounted on the carrier and operable for advancing the matches with the holder and for delivering said matches between the side flaps, means for folding the side flaps onto the matches, means for severing the end flaps from the web, means for folding the end flaps and means for fastening one end flap to the side flaps.

10. A match packaging machine including in combination, means for advancing a web of material, means for cutting the side profiles in the web, a revoluble carrier having a plurality of holders, means for intermittently revolving said carrier, means for delivering a predetermined number of matches

successively to each holder, fixed means for retaining the matches in the holder, a rear gate movably mounted on the carrier, means for moving said gate approximately radial of the carrier for delivering the matches between the side flaps, means for folding the side flaps onto the matches, means for severing the end flaps from the web, means for folding the end flaps and means for fastening one end flap to the side flaps.

11. A match packaging machine including in combination, means for advancing a web of material, means for cutting the side profiles in the web, a revoluble carrier having a plurality of holders, means for intermittently revolving said carrier, means for delivering a predetermined number of matches successively to each holder, fixed means for retaining the matches in the holder, a rear gate movably mounted on the carrier, a fixed cam, connecting means between the gate and the cam for moving said gate for delivering the matches between the side flaps, means for folding the side flaps onto the matches, means for severing the end flaps from the web, means for folding the end flaps and means for fastening one end flap to the side flaps.

12. A match packaging machine including in combination, means for advancing a web of material, means for cutting the side profiles in the web, a revoluble carrier having a plurality of holders, means for intermittently revolving said carrier, means for delivering a predetermined number of matches successively to each holder, fixed means for retaining the matches in the holder, a rear gate movably mounted on the carrier, a fixed cam, connecting means between the gate and the cam, said cam having a portion of its path movable radially relative to the carrier axis when said movable portion is in engagement with the connecting means with the gate, means for folding the side flaps onto the matches, means for severing the end flaps from the web, means for folding the end flaps and means for fastening one end flap to the side flaps.

13. A match packaging machine including in combination, means for advancing a web of material, means for cutting the side profiles in the web, a revoluble carrier having a plurality of holders, means for intermittently revolving said carrier, means for delivering a predetermined number of matches successively to each holder, fixed means for retaining the matches in the holder, a rear gate movably mounted on the carrier, a fixed cam, connecting means between the gate and the cam, said cam having a portion of its path movable radially relative to the carrier axis when said movable portion is in engagement with the connecting means with the gate, a pair of side flap folders, means for moving said folders inwardly and

downwardly toward each other, means for severing the end flaps from the web, means for folding the end flaps and means for fastening one end flap to the side flaps.

14. A match packaging machine including in combination, means for advancing a web of material, means for cutting the side profiles in the web, a revoluble carrier having a plurality of holders, means for intermittently revolving said carrier, means for delivering a predetermined number of matches successively to each holder, fixed means for retaining the matches in the holder, a rear gate movably mounted on the carrier, a fixed cam, connecting means between the gate and the cam, said cam having a portion of its path movable radially relative to the carrier axis when said movable portion is in engagement with the connecting means with the gate, a pair of side flap folders, means for moving said folders synchronously inwardly and downwardly in substantial parallelism toward each other, means for severing the end flaps from the web, means for folding the end flaps and means for fastening one end flap to the side flaps.

15. A match packaging machine including in combination, means for advancing a web of material, means for cutting the side profiles in the web, means for placing a plurality of matches between the side flaps, means for folding the side flaps onto the matches all during the maintenance of the integrality of the package with the web, means for severing the end flaps from the web, means for conducting the severed package in a direction transverse to the direction of travel of the web, means for folding the end flaps and means for fastening one end flap to the side flaps.

16. A match packaging machine including in combination, means for advancing a web of material, means for cutting the side profiles in the web, means for placing a plurality of matches between the side flaps, means for folding the side flaps onto the matches, means for severing the end flaps from the web; a revoluble carrier having a plurality of holders and having its axis parallel to the direction of travel of the web, means for intermittently revolving the carrier, means for delivering the package to the carrier holder synchronously with the severing of the end flaps from the web, fixed means for coaction with said revoluble carrier for folding the end flaps and means for fastening one end flap to the side flaps.

17. A match packaging machine including in combination, means for intermittently advancing a web of material, means for cutting the side profiles in the web, means for timing the web with the cutting means, means for placing a plurality of matches between the side flaps, means for folding

the side flaps onto the matches, means for severing the end flaps from the web, means for conducting the severed package in a direction transverse to the direction of travel of the web, means for folding the end flaps and means for fastening one end flap and the side flaps to the back.

18. A match packaging machine including in combination, means for intermittently advancing a web of material, means for cutting the side profiles in the web, means for timing the web with the cutting means, means for creasing the blank, means for folding the side flaps normal to the web, means for placing a plurality of matches between the side flaps, means for folding the side flaps onto the matches, means for retaining the side flaps in their folded positions over the matches, means for severing the end flaps from the web, means for conducting the severed package in a direction transverse to the direction of travel of the web, means for folding the end flaps and means for fastening one end flap and the side flaps to the back.

19. A match packaging machine including in combination, means for intermittently advancing a web of material, means for cutting the side profiles in the web between consecutive intermittent advancements of said web, means for placing a plurality of matches between the side flaps, means for folding the side flaps, all during the maintenance of the integrality of the package with the web, means for severing the end flaps from the web, means for folding the end flaps and means for fastening one end flap to the side flaps.

20. A match packaging machine including in combination, means for intermittently advancing a web of material, means for cutting the side profiles in the web between consecutive intermittent advancements of said web, means for folding the side flaps normal to the web, means for placing a plurality of matches between the side flaps and means for folding the side flaps, all during the maintenance of the integrality of the package with the web, and means for completing the package.

21. A match packaging machine including in combination, means for intermittently advancing a web of material and the following instrumentalities serially arranged and simultaneously operable between consecutive intermittent advancements of said web: means for cutting the side profiles in the web, means for folding the side flaps, means for severing the end flaps from the web and means for fastening the short end flap to the side flaps; and means, operable during the advancement of the web and located between the end flap severing means and the flap fastening means, for folding the end flaps.

22. A match packaging machine including in combination, means for intermittently advancing a web of material, the following instrumentalities serially arranged and simultaneously operable between consecutive intermittent advancements of said web: means for cutting the side profiles in the web, means for registering the web with said cutting means, means for forming two pairs of approximately parallel creases lengthwise the blank, means for folding the side flaps upwardly normal to the web along the outer pair of creases, means for folding the side flaps upwardly normal to the web along the inner pair of creases, means for completing the folding of the side flaps, means for severing the end flaps from the web, means for delivering the severed package to the revoluble carrier, means for fastening the short end flap to the side flaps and means for ejecting the package from the carrier; and the following instrumentalities simultaneously operable during the advancement of the web: a revoluble carrier, located between the end flap severing means and the flap fastening means, for conducting the package in a direction transverse to the direction of travel of the web and means for coacting with said carrier for folding the end flaps.

23. A match packaging machine including in combination, a pair of intermittently operable feed rolls for delivering the web to the machine and web feeding means at the discharge end of the machine, means for cutting the side profiles in the web, means for placing a plurality of matches between the side flaps, means for folding the side flaps, means for severing the end flaps from the web, means for folding the end flaps and means for fastening one end flap to the side flaps.

24. A match packaging machine including in combination, means for advancing a web of material, means for cutting the side profiles in the web, means for delivering a plurality of matches to the package, means for folding the side flaps, all during the maintenance of the integrity of the package with the web, means for severing the end flaps from the web, means for conducting the severed package in a direction transverse to the direction of travel of the web, means for folding the end flaps and means for fastening one end flap to the side flaps.

25. A match packaging machine includ-

ing in combination, means for advancing a web of material, means for cutting the side profiles in the web, means for delivering a plurality of matches to the package, means for folding the side flaps, means for severing the end flaps from the web; a revoluble carrier having a plurality of holders and having its axis parallel to the direction of travel of the web, means for intermittently revolving the carrier, means for delivering the package to the carrier holder synchronously with the severing of the end flaps from the web, fixed means for coaction with said revoluble carrier for folding the end flaps and means for fastening one end flap to the side flaps.

26. A match packaging machine including in combination, means for intermittently advancing a web of material, means for cutting the side profiles in the web, means for timing the web with the cutting means, means for delivering a plurality of matches to the package, means for folding the side flaps, all during the maintenance of the integrality of the package with the web, means for severing the end flaps from the web, means for conducting the severed package in a direction transverse to the direction of travel of the web, means for folding the end flaps and means for fastening one end flap and the side flaps to the back.

27. A match packaging machine including in combination, means for intermittently advancing a web of material, means for cutting the side profiles in the web, means for timing the web with the cutting means, means for creasing the blank, means for folding the side flaps normal to the web, means for folding the side flaps parallel with the web, means for retaining the side flaps in their folded positions, means for severing the end flaps from the web, means for conducting the severed package in a direction transverse to the direction of travel of the web, means for folding the end flaps and means for fastening one end flap and the side flaps to the back.

Signed this 26th day of February, 1910, before two subscribing witnesses.

CHARLES F. SMITH.

Witnesses:

LA FOY G. BARBER,
ARTHUR MEDER.