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Patented July 12, 1910.

8 SHEETS.—SHEET 1.



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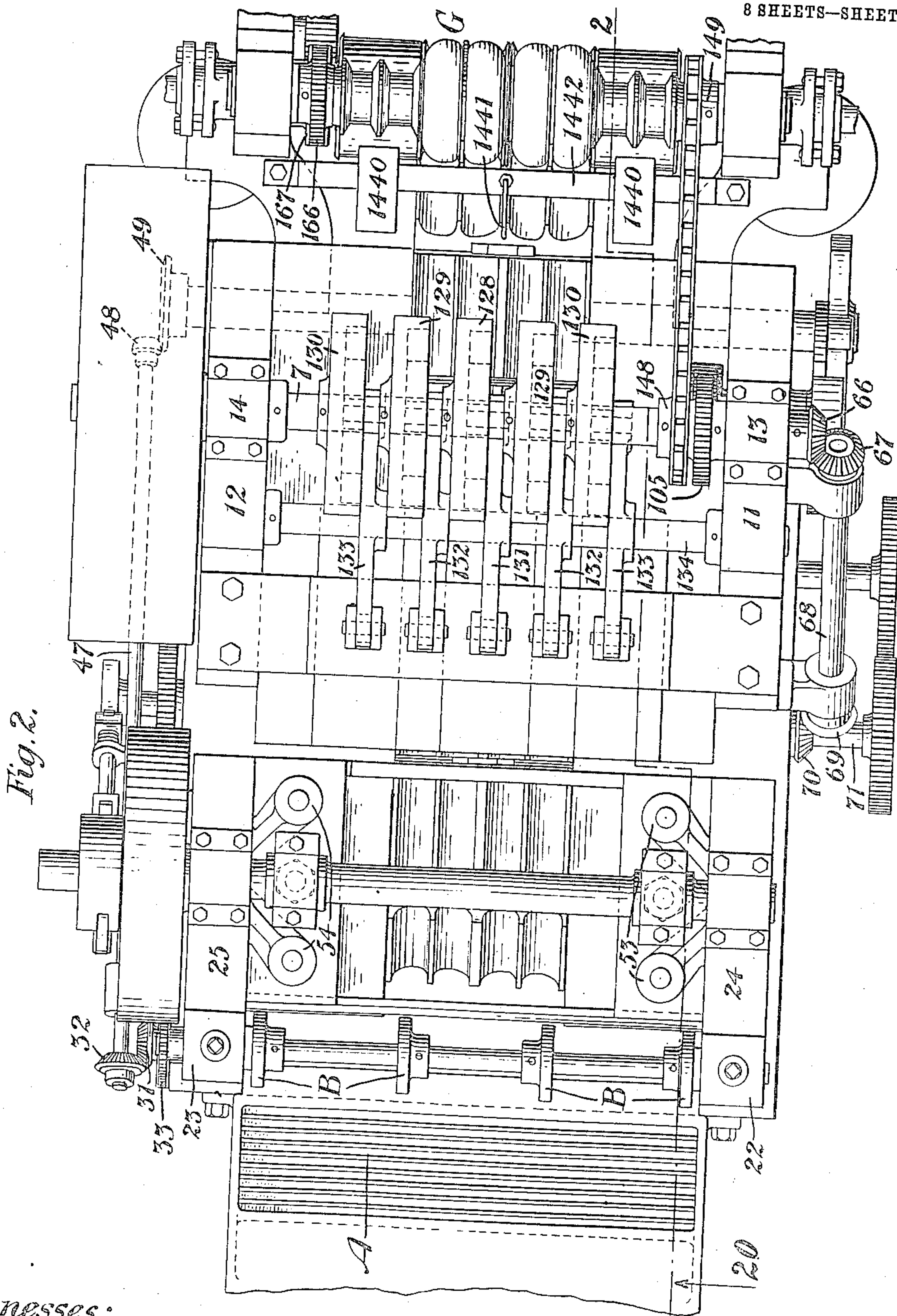
E. N. GILFILLAN & E. SCHINSCHOLL.
CARTON MACHINE.

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8 SHEETS—SHEET 2.

964,232.



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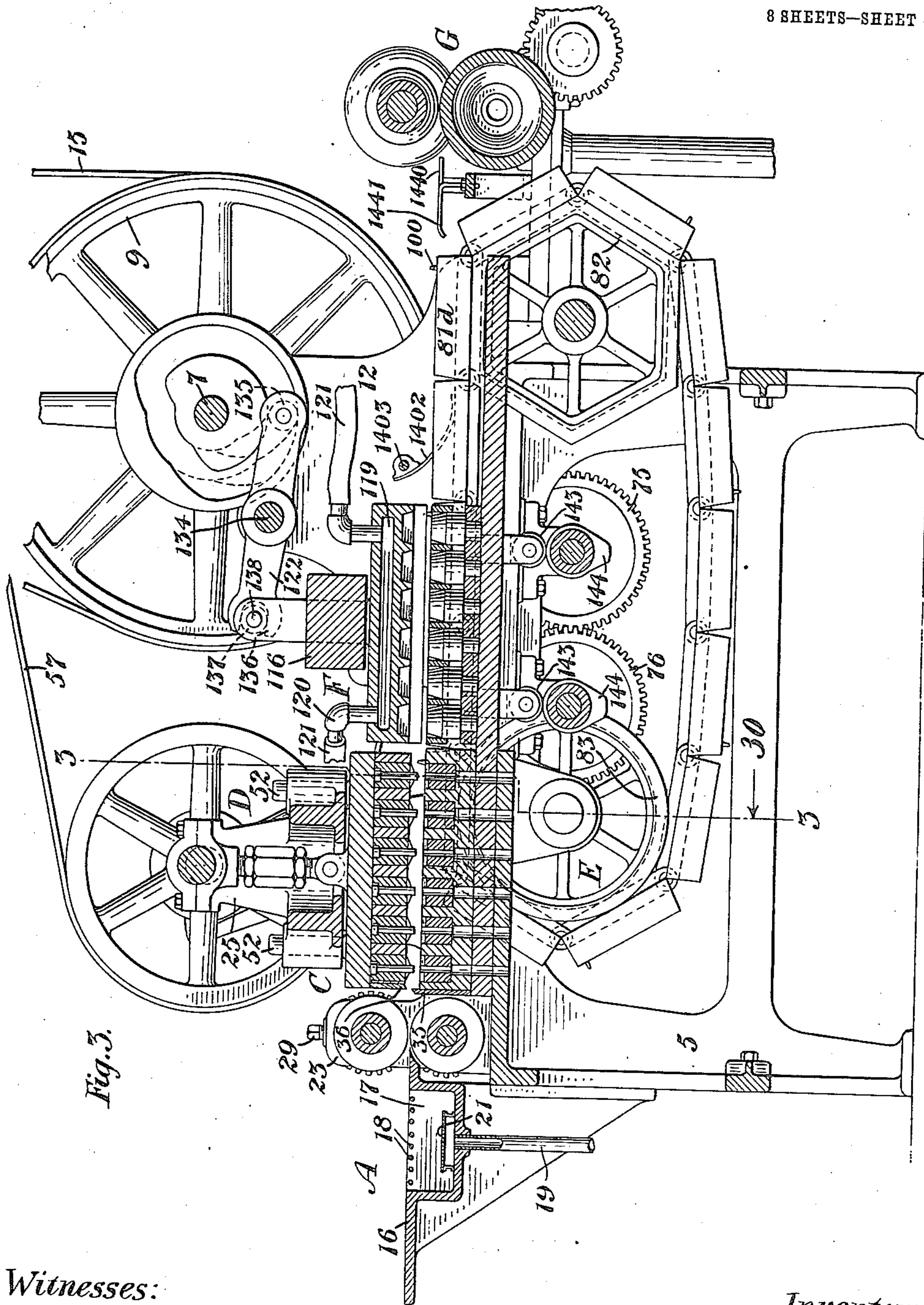


Fig. 3.

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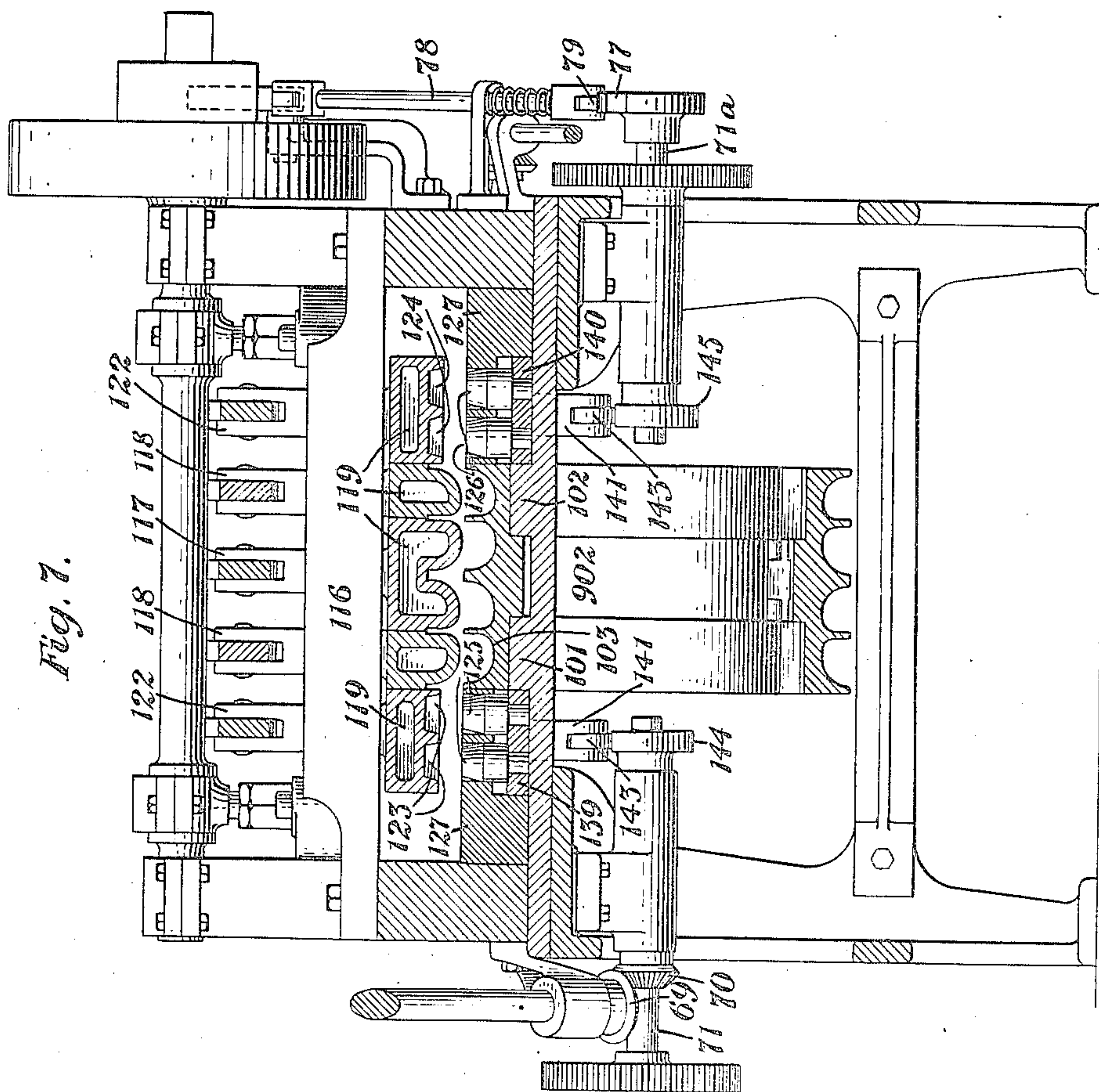


Fig. 7.

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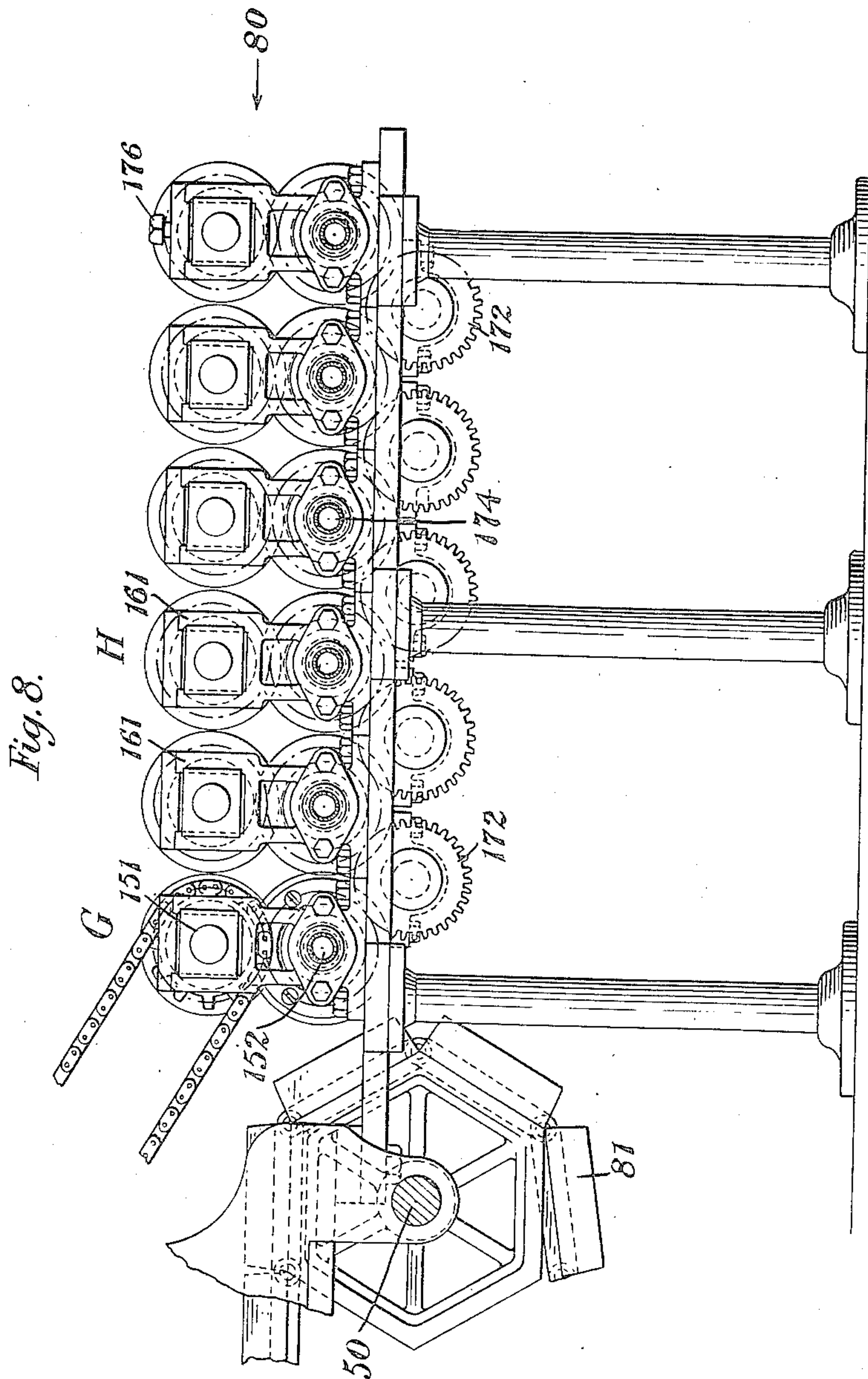
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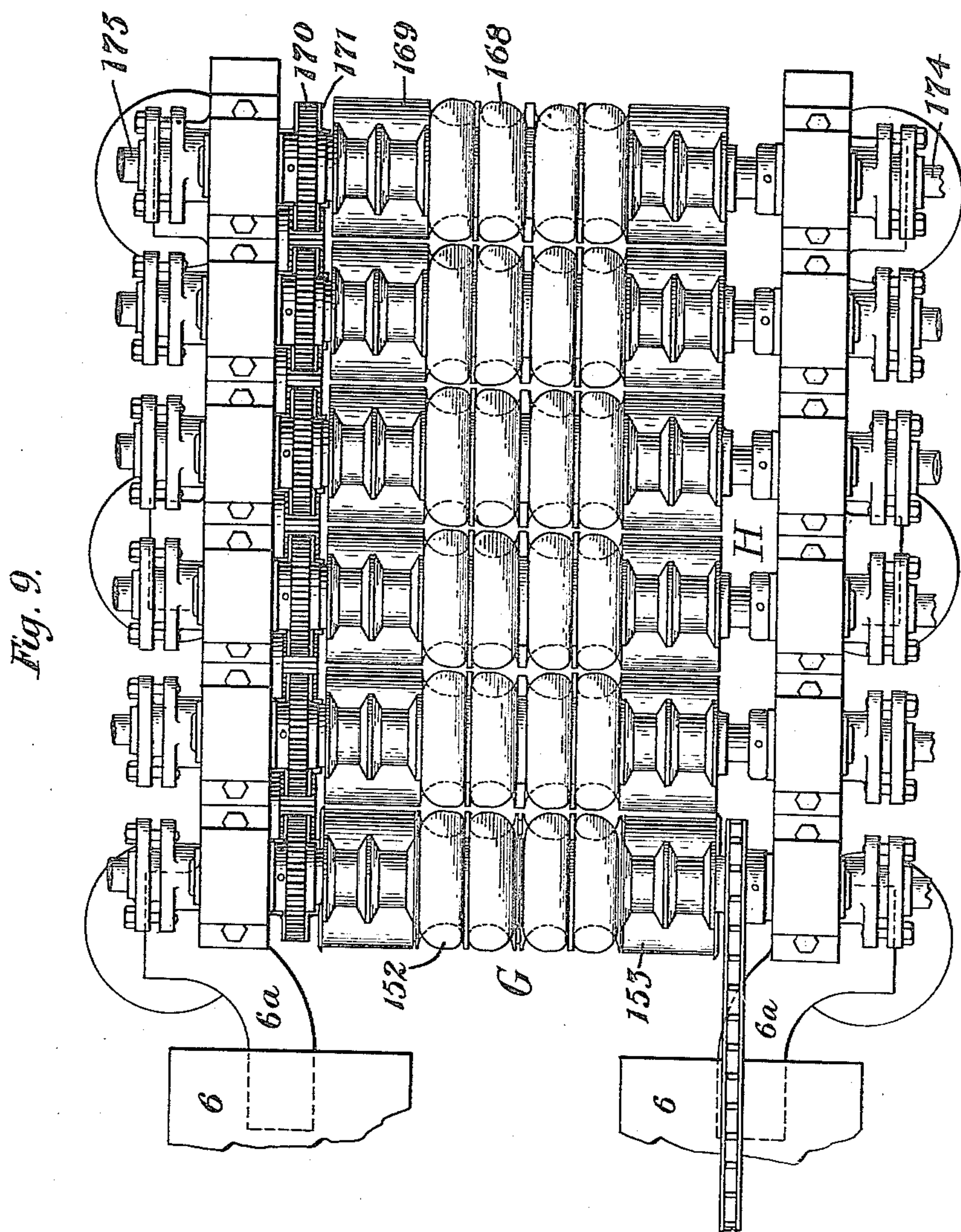
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8 SHEETS—SHEET 7.



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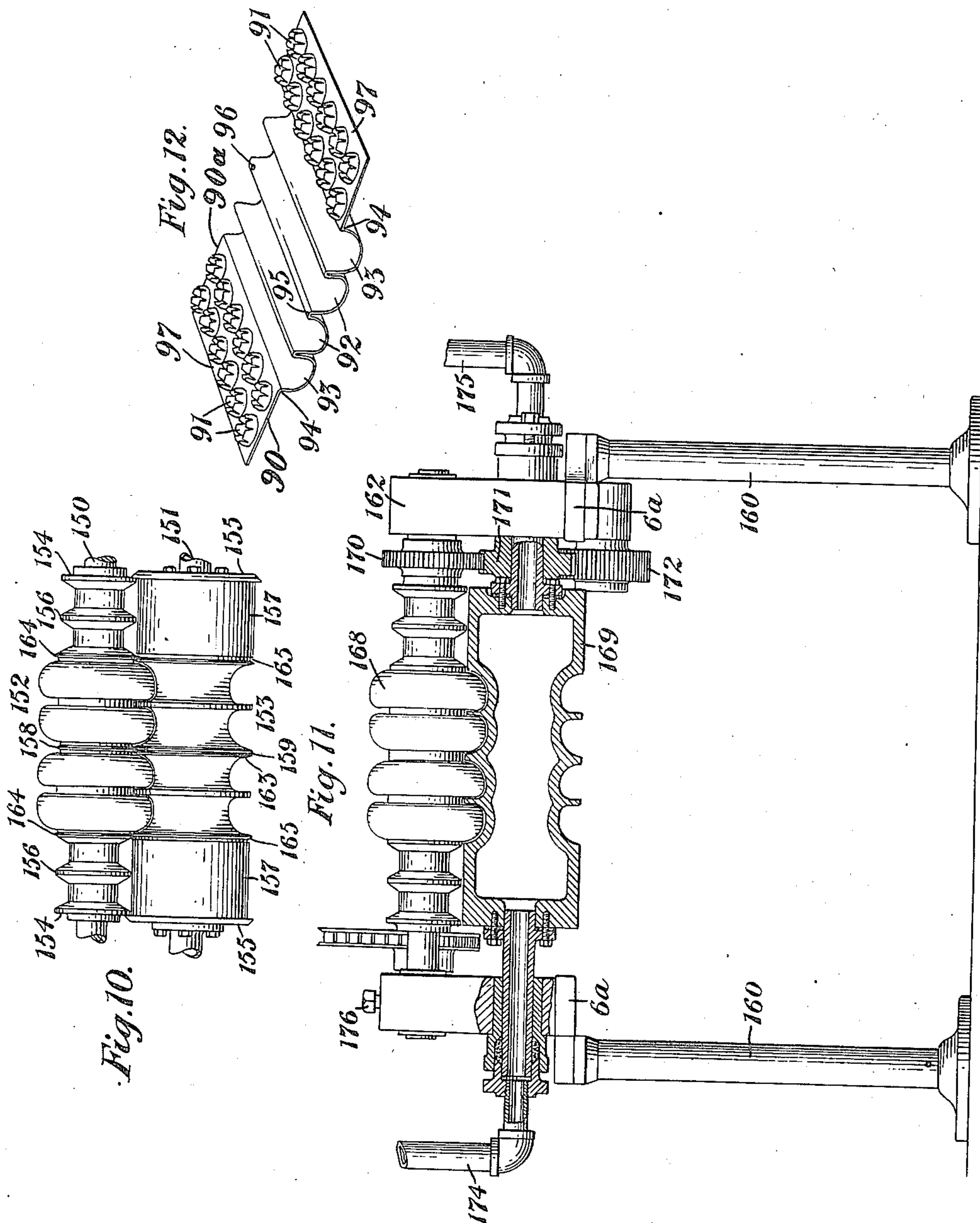
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8 SHEETS—SHEET 8.



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UNITED STATES PATENT OFFICE.

ESSINGTON N. GILFILLAN AND ERICH SCHINSCHOLL, OF SYRACUSE, NEW YORK, ASSIGNORS TO CONTINENTAL PAPER BAG COMPANY, A CORPORATION OF MAINE.

CARTON-MACHINE.

964,232.

Specification of Letters Patent.

Patented July 12, 1910.

Application filed December 7, 1909. Serial No. 531,876.

To all whom it may concern:

Be it known that we, ESSINGTON N. GILFILLAN, a citizen of the United States, and ERICH SCHINSCHOLL, a subject of the Emperor of Germany, and residents of Syracuse, in the county of Onondaga and State of New York, have invented certain new and useful Improvements in Carton-Machines, of which the following is a specification.

This invention relates to carton machines and especially to that class of such machines as is adapted to automatically produce cartons of straw board or similar material for the safe package and shipment of fragile articles such as fruit, eggs and confections.

The object of the present invention is to furnish a machine compact in construction, simple and rapid in operation and reliable and accurate in results.

While our improvements are adapted to a more or less wide range of product within the spirit and scope of our invention, we have illustrated and described said improvements as particularly designed for the manufacture of cartons for the packaging of eggs or similar small articles.

With these ends in view our improvements comprise features illustrated in their preferred embodiment in the accompanying drawings. Therein—

Figure 1 is a side elevation of the forming portion of the machine; Fig. 2 is a plan view corresponding with Fig. 1. Fig. 3 is a longitudinal sectional elevation on line 2, 2 of Fig. 2 and looking in the direction of arrow 20. Fig. 4 is a cross sectional elevation on line 3, 3 of Fig. 3 and looking in the direction of arrow 30. Fig. 5 is a face view of one of the punches and Fig. 6 is a side elevation of both a punch and die. Fig. 7 is a cross sectional elevation on line 1, 1 of Fig. 1 looking in the direction of arrow 10. Fig. 8 is a side elevation of the finishing portion of the machine. Fig. 9 is a plan view corresponding with Fig. 8. Fig. 10 is a detail front elevation of the trimming and scoring rolls. Fig. 11 is an end elevation; partly in section looking in the direction of arrow 80 in Fig. 8. Fig. 12 is a perspective view of the type of carton which the present embodiment of our improved machine is designed to produce.

For convenience of description we have chosen to divide the illustrated machine into

two grand divisions; the first being the forming portion and the second the finishing portion. The several operations of the first grand division are intermittent and the several operations of the second grand division are preferably continuous and are so illustrated and described but they may also if desired be intermittent corresponding with the operations of the first grand division. In the forming portion of our machine is comprised means for successively dampening, feeding, shearing, punching and shaping the blanks. In the finishing portion is comprised means for trimming, scoring and drying.

First grand division—Forming.—The general organization of this portion of our improved machine comprises side frames 4, 5 and table 6 thereon to which are fixed dampening table A, feed rolls B, shears C, punching means D and shaping means E. Uprights 11, 12 on opposite sides of table 6 have bearings 13, 14 in the upper portions thereof respectively for the support of main shaft 7. Said shaft has pulley 9 fixed to the rearward end thereof (Fig. 1) and is rotated continuously by belt 15 from some convenient source of power not shown.

We will now proceed to describe in detail the several mechanisms of the forming portion of our improved machine.

Dampening table A comprises shelf 16 having steam box 17 therebelow. Rods 18 across the top of box 17 permit steam to rise therebetween to dampen the paper or straw board as it passes thereover. Steam is supplied from some convenient source not shown, through pipe 19, and baffle plate 21 is provided to distribute the steam within said box.

Feed rolls B are mounted in suitable bearings 22, 23 formed in brackets 24, 25. Shaft 26 of the upper feed rolls is arranged for adjustment by means of screws 28, 29. Power is communicated to shaft 27 of the lower feed rolls from intermittent gear shaft 50 by means of bevel gear 49 on said shaft 50 driving bevel gear 48 on the lower end of inclined shaft 47 and bevel gear 32 on the upper end of said inclined shaft driving bevel gear 31 on said shaft 27. Upper roll shaft 26 is rotated in unison with shaft 27 through gears 33, 34.

Shears C comprise fixed blade 35 fast to the ends of die-beds 45, 46 respectively and

reciprocating blade 36 fixed to the ends of punch carriers 37, 38 respectively.

Punching means D comprises two rows of dies 42 in die-bed 45 and two rows of punches 41 in punch-carrier 37 on the one side and a similar equipment of two rows of dies 44 in die-bed 46 and two rows of punches 43 in punch-carrier 38 on the other side. As illustrated each row of punches and dies consists of six making a total of twenty-four pairs of punches and dies. The detail construction of said punches and dies is shown on an enlarged scale in Figs. 5 and 6. Punch 41 comprises projecting cylindrical portion 41^a at the center for coaction with cylindrical hole 42^a of die 42 for cutting a small disk from the center of each pocket 91 of the carton. Radiating from central portion 41^a of said punch are blades 41^b for coaction with complementary blades 42^b of die 42 for cutting a plurality of radial slots to facilitate the formation of said pockets 91 of the carton.

Punch carriers 37, 38 are fixed to the under faces of heads 39, 40, having guide posts 51, 52 upstanding therefrom; said guide posts being vertically reciprocable in brackets 53, 54 inreaching from uprights 11, 12 all respectively. Intermittent reciprocatory movement is imparted to said punch heads 39, 40 by the following means. Shaft 55 is mounted for rotation in suitable boxes in the upper ends of uprights 11, 12. Pulley 56 is mounted for free rotation on shaft 55 and is driven continuously from pulley 9 by means of belt 57. At 58 fixed to shaft 55 is indicated the usual one revolution punch press clutch mechanism which may be operated to lock pulley 56 to shaft 55 to cause said shaft to make one revolution and then stop. Said clutch is caused to engage with said pulley by throwing out locking dog 59 pivoted at 60 in bracket 61 on upright 12. Pulley 56 is provided with a heavy rim so as to act as a fly wheel when clutch 58 is locked therewith to revolve shaft 55. Said shaft 55 is provided with eccentric portions 62, 63 and adjustable rods 64, 65 connect said eccentrics with punch heads 39, 40 all respectively. Clutch dog 59 may be thrown out of engagement with clutch 58 at predetermined intervals by the following means. On the near end of main shaft 7 (Fig. 2) is fixed bevel gear 66 driving bevel gear 67 on the upper end of shaft 68. On the lower end of said shaft 68 is bevel gear 69 driving bevel gear 70 on shaft 71. On the rear end of shaft 71, on portion 71^a thereof, (Fig. 7) is cam 77 for the engagement of roll 79 in the lower end of thrust rod 78. The upper end of rod 78 is pivoted to lower arm 590 of locking dog 59. Thus when rod 78 is thrust upwardly by the high part of cam 77 dog 59 will be rocked on its pivot 60 and release clutch 58 to engage and be driven

by pulley 56. For convenience of arrangement shaft 71 comprises two portions 71, 71^a (Fig. 7). Equal rotary motion is communicated from portion 71 to portion 71^a as follows: Adjacent to and parallel with shaft 71 and extending entirely across the machine is shaft 72. Adjacent to bevel gear 70 on shaft 71 is gear 73 driving gear 74 on shaft 72. On the opposite end of shaft 72 is gear 75 driving gear 76 on shaft 71^a.

The conveying means E comprises an intermittently operable endless chain having links 81 pivotally connected together and supported on sprocket 82 and pulley 83. Sprocket 82 is fixed to and driven by shaft 50. Pulley 83 is mounted on shaft 84 turning freely in bearings 85, 85 depending from table 6. Said links 81 are of uniform length and that length is preferably evenly divisible into the length of the carton which the machine is designed to make. In the present instance each link has a length equal to one half the length of the carton. Sprocket 82 and pulley 83 are positioned vertically so as to bring the tops of ribs 98, 99 of links 81 level with the faces of dies 42, 44 of the punching means, and said chain links are supported in their upper run on tracks 101, 102 of table 6. Pulley 83 is positioned horizontally so as to locate the leading edge of the link directly thereover in substantially the same vertical plane as the forward edges of punch carriers 37, 38. Alternate links as 81^a are provided near their leading ends with feed pins as 100 upstanding from their central ribs as 98. For coaction with successive pins 100, to cause the carton blank to be impaled thereon, die bar 104 having die 103 therein is fixed to and moved up and down in unison with punch carriers 37, 38.

As the carton has a length equal to the combined length of two links 81, and sprocket 82 has six faces, to obtain a chain feed in increments of the carton length it is necessary to rotate said sprocket 82 one third of a revolution for each cycle of the machine. Intermittent rotary motion of this character is communicated to said sprocket and to shaft 50 by the following means: gear 105 on main shaft 7 drives equal gear 108 on stud 109 through intermediate gear 106 on stud 107. Fixed to gear 108 is driver 110 having two rolls 111, 111 pivotally mounted on the face thereof for engagement with successive slots 114 of star wheel 113 fixed to shaft 50. Driver 110 is also provided with stop face 112 for engagement with successive locking arcs 115 intermediate slots 114 on star wheel 113, all of well known construction. Thus one third of a revolution of main shaft 7 and driver 110 imparts to star wheel 113, shaft 50 and sprocket 82 one third of a revolution. During the other two thirds of the revolution

of driver 110 stop face 112 is in engagement with one of the locking arcs 115 of star wheel 113. Thus said star wheel, shaft 50, sprocket 82 and chain links 81 are at rest during two thirds of the time.

The shaping means F comprise a series of successively acting instrumentalities positioned directly succeeding the punching means D and longitudinally coincident with the position of chain links 81^b and 81^c. Chain links 81 have grooves 902, 903 in the upper faces thereof corresponding in profile with the desired shapes of portions 92, 93 respectively of the carton (Fig. 12). In cross bar 116 are mounted vertically reciprocable plungers 117, 118, having their lower ends formed complementary to grooves 902, 903 respectively of chain links 81; also said lower ends of plungers 117, 118 are of a length equal to the combined length of two chain links. Adjacent to plungers 118 in cross bar 116 are plungers 122 each having in their lower ends two rows of sockets 123, 124 respectively corresponding in number and relative positions with dies 42, 44 respectively of the punching means. The lower ends of plungers 117, 118 and 122 are each provided with cavities 119 for the circulation of steam therethrough for heating and drying the carton as it is shaped. Steam may be conducted through said cavities from some suitable source of supply not shown, by pipes as 120, having flexible connections as 121. For coaction with the lower faces of plungers 122 stationary tables 127, are provided and for coaction with sockets 123, 124 of said plungers vertically reciprocable plugs 125, 126 respectively are provided. Plungers 117, 118 and 122 are operated from cams as 128 on main shaft 7, through rock arms as 131 pivoted on shaft 134 fixed in frames 11, 12. Said rock arms have pivotally mounted on the forward ends of each, rolls as 135 for engagement with the cam slots in said cams and the rear ends of said rock arms are bifurcated as at 136 for engagement with rolls as 137 pivotally supported on pins as 138 in the upper ends of said plungers as 122. The cam paths of cams 128, 129 and 130 are substantially alike but are located circumferentially relative to each other so that plunger 117 descends first, plungers 118 next and plungers 122 last. Plugs 125, 126 are mounted in plates 139, 140 respectively. Said plates each have downwardly reaching posts as 141 having rolls as 143 pivotally mounted in the lower ends thereof for engagement with cams as 144 on shafts 71, 72. Thus the continuous rotation of shafts 71, 72 impart to plugs 125, 126 an intermittent vertical movement. The timing of this movement of plugs 125, 126 is such as to cause them to rise for coaction with sockets 123, 124 directly after plungers

122, having said sockets in their lower ends, have descended to hold wings 97 of the carton against tables 127. The next increment of movement of conveyer E will position the partly made carton at an idle station directly under main shaft 7 at which station said carton passes under one or more fingers 1402 supported on rod 1403 fixed in side frames 11, 12. Said fingers reach downwardly into troughs 92 and bear against the bottom thereof to assist the carton to free itself from pin 100 as the link to which that pin is fixed passes downwardly over sprocket 82 at the beginning of the next incremental feed of conveyer E. Table 1440 comprising two flat end members for supporting wings 97, 97 of the carton and central rail 1441 for supporting portions 95 as said carton passes from conveyer E to the trimming and scoring means G is mounted on frame 1442 on table 6^a.

We now come to the second grand division of our improved machine and which division comprises first the trimming and scoring means G. As these instrumentalities are for convenience mounted on one pair of rolls we have chosen to describe them under one heading. Referring to Figs. 1, 2, 8 and 10 table 6^a is fixed to and extends forwardly from table 6. Said table 6^a comprises a right and left portion (Figs. 9 and 11) and has legs 160 thereunder. A plurality of bearing boxes 161, 162 are mounted on opposite portions of said table 6^a and in that pair of boxes 161, 162 nearest sprocket 82 are revolvably mounted shaft 150 above, and 151 below (Figs. 8 and 10). On shaft 151 is drum 153 having circumferential grooves corresponding in profile with the form previously given to the carton by the shaping means F. Shaft 150 is provided with drum 152 complementary in profile to drum 153. Said drum 153 is provided at each end with cutter disks 155, 155 for coaction with ends 154, 154 of drum 152 thus forming two pairs of coating rotary shears for trimming longitudinal edges 97, 97 of the carton as it is fed between drums 152, 153. For coaction with cylindrical portions 157, 157 of drum 153 collars 156, 156 and the cylindrical edges of ends 154 154 are provided on drum 152. By reducing the diameter of drum 152 between ends 154 and collars 156 and between said collars 156 and the central portion of said drum openings are provided to permit the passage without injury between drums 152, and 153, of raised ears 91 of the carton.

To permit the free folding of the carton in either direction, along folds 94 and 95 we provide the following means for double scoring those folds. Midway the length of drum 153 circumferential rib 163 has groove 159 therearound for coaction with rib 158 encircling drum 152 for double scoring fold 95. Similar grooves 165 in drum 153 and

ribs 164 on drum 152 are provided for double scoring folds 94, 94.

While we have in the present embodiment illustrated our scoring means and trimming means as mounted upon one pair of shafts or drums we sometimes find it advantageous to mount the scoring means on one pair of shafts and the trimming means on another pair of shafts.

Power for continuous rotation is transmitted to shafts 150, 151 by the following means. Shaft 150 has sprocket 149 thereon connected to sprocket 148 on main shaft 7 by drive chain 147; and shaft 150 has gear 166 thereon driving equal gear 167 on shaft 151.

The drying means H comprises a series of successively acting pairs of heated rolls or drums as 168, 169 revolvably mounted in bearing boxes 161, 162 and are driven at a uniform speed and in the proper directions by a train of gears as 170, 171 and intermediates 172. Said rolls are driven at a uniform speed and in the proper directions from gear 167 on shaft 151 through intermediates as 172 and drum gears as 170, 171. The profiles of drums 168, 169 are similar to the profiles of drums 152, 153 with the omission of cutting and scoring means. Lower drums 169 and their shafts are illustrated as hollow and steam for heating may be circulated therethrough from any convenient source of supply by means of pipes as 174, 175. Upper rolls 152 and 168 may be adjusted relative to their respective lower rolls by means of screws as 176.

The operation of our improved machine is as follows: Paper or cardboard of a suitable quality is supplied to the first grand division of said machine preferably from a continuous roll not shown, over table A and its leading end delivered between feed rolls B to a position even with the rearward edge of cutter 36. The width of said paper is such as to substantially fill the space between uprights 11, 12. Steam is now supplied through pipe 19 to steam box 17, through pipes as 78, to the shaping means F and through pipes as 174, to the drying means H. Main shaft 7 is thereupon rotated in the direction of the arrow adjacent to pulley 9 (Fig. 1) and when driver 110 has made two thirds of a revolution leading roll 111 will engage the adjacent slot 114 in star wheel 113 and said star wheel will be turned one third of a revolution. Through bevel gears 48, 49, shaft 47 and bevel gears 31, 32, feed rolls B will be rotated to feed the web of material forwardly one carton length, delivering the leading edge 90^a thereof even with the forward end of punching means D and over pin 100. Cam 77 now presents its high portion to roll 79 and rod 78 rocks locking dog 59 out of

engagement with clutch 58 and which clutch is thereupon engaged by pulley 56 and shaft 55 and eccentrics 62, 63 rotated to move punch heads 39, 40 carrying punches 41, 43 downwardly into coaction with dies 42, 44 in die-beds 45, 46 all respectively. Coincidentally blade 36 descends for coaction with fixed blade 35 and shears off the carton blank along line 90 thereof (Fig. 12). The coaction of punches 41, 43 with dies 42, 44 respectively cut the center disks from pockets 91 of the carton and also cut the slots radiating from the holes left by said disks. The disks are waste and pass downwardly through the dies and out through holes 420 in table 6. The downward movement of punch carriers 37, 38 cause die bar 104 fixed therebetween to descend and die 103 to impale the carton blank onto pin 100 upstanding from the center of the forward end of link 81^a. Eccentric shaft 55 continues in rotation, punch heads 39, 40 are returned to their upper positions, locking dog 59 drops into engagement with clutch 58 which is thereupon released from engagement with pulley 56 and shaft 55 comes to rest after having made one complete rotation. Conveyer E now moves forward one increment presenting the punched blank for operation by the shaping means F. Thereupon plunger 117 descends forcing the partly made carton down into grooves 902 and thereby drawing wings 97, 97 inwardly toward said plunger 117. After said plunger has descended, plungers 118, 118 descend simultaneously and press portions 93, 93 of the carton into grooves 903, 903 thereby drawing wings 97, 97 still farther inward and positioning pockets 91 therein over corresponding plugs 125, 126 respectively. Plungers 122, 122 now follow downwardly and clamp wings 97, 97 against tables 127, 127 and the high portions of cams 144, 145 force upwardly posts 141, 142, plates 139, 140 and plugs 125, 126 therein. Said plugs thereupon force upwardly and spread out into sockets 123, 124 the several wings or pockets 91, 91 of wings 97, 97 of the carton. During the dwell of plungers 117, 118 and 122 in their lower positions their steam heated lower ends will partially dry and therefore to some extent set the form into which said plungers have shaped the carton. Said plungers 117, 118, and 122 are now retracted upwardly and plugs 125, 126 are retracted downwardly to their initial and inoperative positions respectively and the now shaped carton is moved forward one increment (substantially its own length) by conveyer E, and under fingers 140². The next incremental movement of conveyer E causes link 81^a to descend around sprocket 82 and pin 100 in said link is thereby withdrawn from engagement with hole 96 (see Fig. 12)

in the carton. Said carton is prevented from following link 81^a and pin 100 around sprocket 82 by means of fingers 1402 which retain the rearward end of said carton in contact with the next succeeding conveyer link.

The forward end of the carton passes onto and over table 1440 and thence into the continuously operating second grand division of our improved machine. Said carton is gripped and advanced between drums 152, 153 and the outer edges of wings 97, 97 are trimmed by rotary shears 154, 155. Simultaneously a double score is formed in each of folds 94, 94 and 95 of the carton by means of coacting ribs and grooves 164, 165 and 158, 159 of drums 152, 153 all respectively. The carton now passes between the upper and lower members as 168, 169 of successive pairs of steam heated drying rolls by which it is dried and set in its predetermined form. The last pair of rolls discharge the completed carton from the machine.

We claim:

1. The combination, in a machine of the class described, of means for intermittently advancing a web of material, means for severing a blank of predetermined length therefrom, means, simultaneously operative with the severing means, for punching a plurality of holes each having a plurality of cuts radiating therefrom, in said blank, means for intermittently advancing the blank, means for forming a plurality of longitudinal grooves in the blank, means for forming the blank portions about the punched holes into pockets and means for drying and setting the formed blank.

2. The combination, in a machine of the class described, of means for advancing a web of material, means for severing a blank therefrom, reciprocatory means for punching a plurality of holes each having a plurality of cuts radiating therefrom, in said blank, means for advancing the punched blank, and means for forming the blank portions about the punched holes into pockets.

3. The combination, in a machine of the class described, of means for advancing a web of material, means for severing a blank therefrom, means for punching a plurality of holes in said blank, an intermittently operative endless conveyer chain for advancing the blank, said chain having a plurality of longitudinal grooves in the outer face thereof and means for locating the blank relative to the chain.

4. The combination, in a machine of the class described, of an intermittently operative endless conveyer chain for advancing the blank, said chain having a plurality of longitudinal grooves in the outer face thereof, means for locating the blank relative to the chain, successively acting means for forcing the blank into the grooves respec-

tively of the chain and means for drying and setting the blank in conformity with said grooves.

5. The combination, in a machine of the class described, of an intermittently operative endless conveyer chain for advancing the blank, said chain having a plurality of longitudinal grooves in the outer face thereof, a plurality of reciprocating plungers above the chain for forcing the blank into the grooves of said chain, means for successively operating said plungers and means for drying and setting the blank when confined between the chain and plungers.

6. The combination, in a machine of the class described, of an intermittently operative conveyer, having a plurality of longitudinal grooves in the face thereof, means for holding a blank on said conveyer, means for punching a plurality of holes, each having a plurality of cuts radiating therefrom, in said blank, means for forcing those portions of said blank contiguous thereto, into said grooves, a table at each side of said conveyer, each of said tables having a plurality of vertically reciprocating plugs therein, a reciprocating plunger over each table and having sockets for coaction with said table plugs, means for locating said blank with the holes therein over the table plugs all respectively, means for successively timing the operations of the means for forcing the blank into the conveyer grooves, the reciprocating plungers and the reciprocating plugs and means for drying the blank during the shaping operations.

7. The combination, in a machine of the class described, of an intermittently operative endless conveyer, having a plurality of longitudinal grooves in the outer face thereof, means for holding a blank on said conveyer, means for punching a plurality of holes, each hole having a plurality of cuts radiating therefrom, in said blank, a group of reciprocating plungers above the conveyer for forcing the blank into the grooves of said conveyer, a reciprocating plunger at each side of the group of reciprocating plungers each having a plurality of pockets in the lower face thereof corresponding with the punched holes in the blank, a table at each side of the conveyer and under the pocketed plungers, each table having a plurality of reciprocating plugs corresponding with the pockets in the plunger faces thereabove, means for locating the blank with its holes over the plugs all respectively, and means for timing the pocketed plungers to descend after the descent of the groove forming plungers and the reciprocating plugs to ascend after the descent of the pocketed plungers.

8. The combination, in a machine of the class described, of an intermittently operative conveyer, having a plurality of longi-

tudinal grooves in the face thereof, means
for holding a blank on the conveyer, recip-
rocating means for punching a plurality of
holes, each having a plurality of cuts radiat-
5 ing therefrom, in the outer side portions of
said blank, reciprocating means for forcing
the middle portions of the blank into the
grooves of the conveyer, reciprocating means
for forming the blank portions about the
10 punched holes into pockets, means for par-
tially drying and setting the blank during
the forming operations, rotary means for
scoring and further drying the formed blank,
and means for timing the several operations
15 of the machine with the conveyer.

9. The combination, in a machine of the
class described, of an intermittently opera-
tive conveyer, having a plurality of longi-
tudinal grooves in the face thereof, means
20 for holding a blank on the conveyer, recip-
rocating means for punching a plurality of

holes, each having a plurality of cuts radiat-
ing therefrom, in the outer side portions of
said blank, reciprocating means for succes-
sively forcing the middle portions of the 25
blank into the grooves of the conveyer, upper
and lower reciprocating means for forming
the blank portions about the punched holes
into pockets, means for partially drying and
setting the blank during the forming opera- 30
tions, rotary means for scoring, trimming
and further drying the formed blank and
means for timing the several operations of
the machine with each other.

Signed this 4th day of December 1909 at 35
Syracuse New York before two subscribing
witnesses.

ESSINGTON N. GILFILLAN.
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