

No. 741,324.

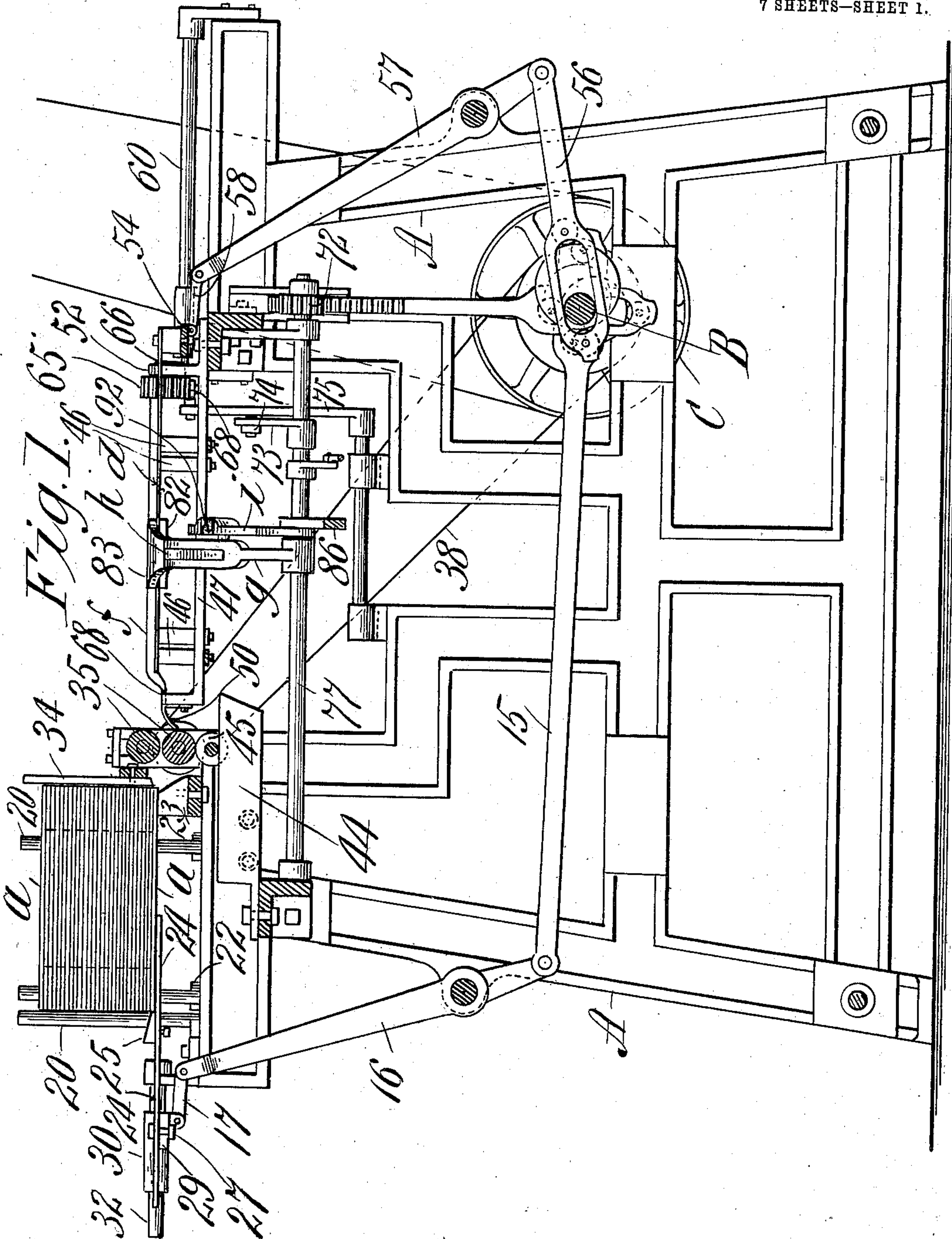
PATENTED OCT. 13, 1903.

C. W. GAY.  
PAPER BOX MACHINE.

APPLICATION FILED APR. 13, 1903.

NO MODEL.

7 SHEETS—SHEET 1.



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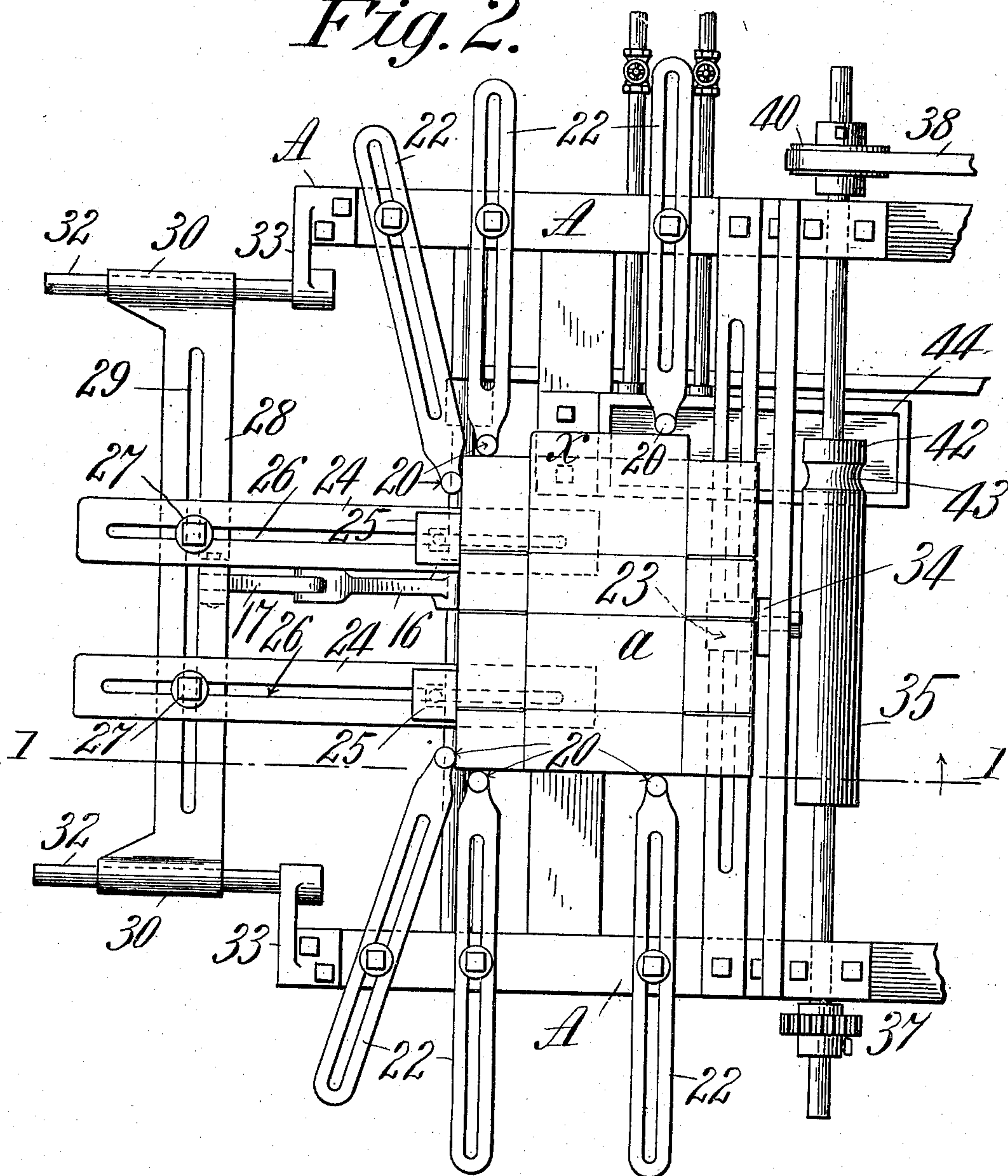
PAPER BOX MACHINE.

APPLICATION FILED APR. 13, 1903.

NO MODEL.

7 SHEETS—SHEET 2.

*Fig. 2.*



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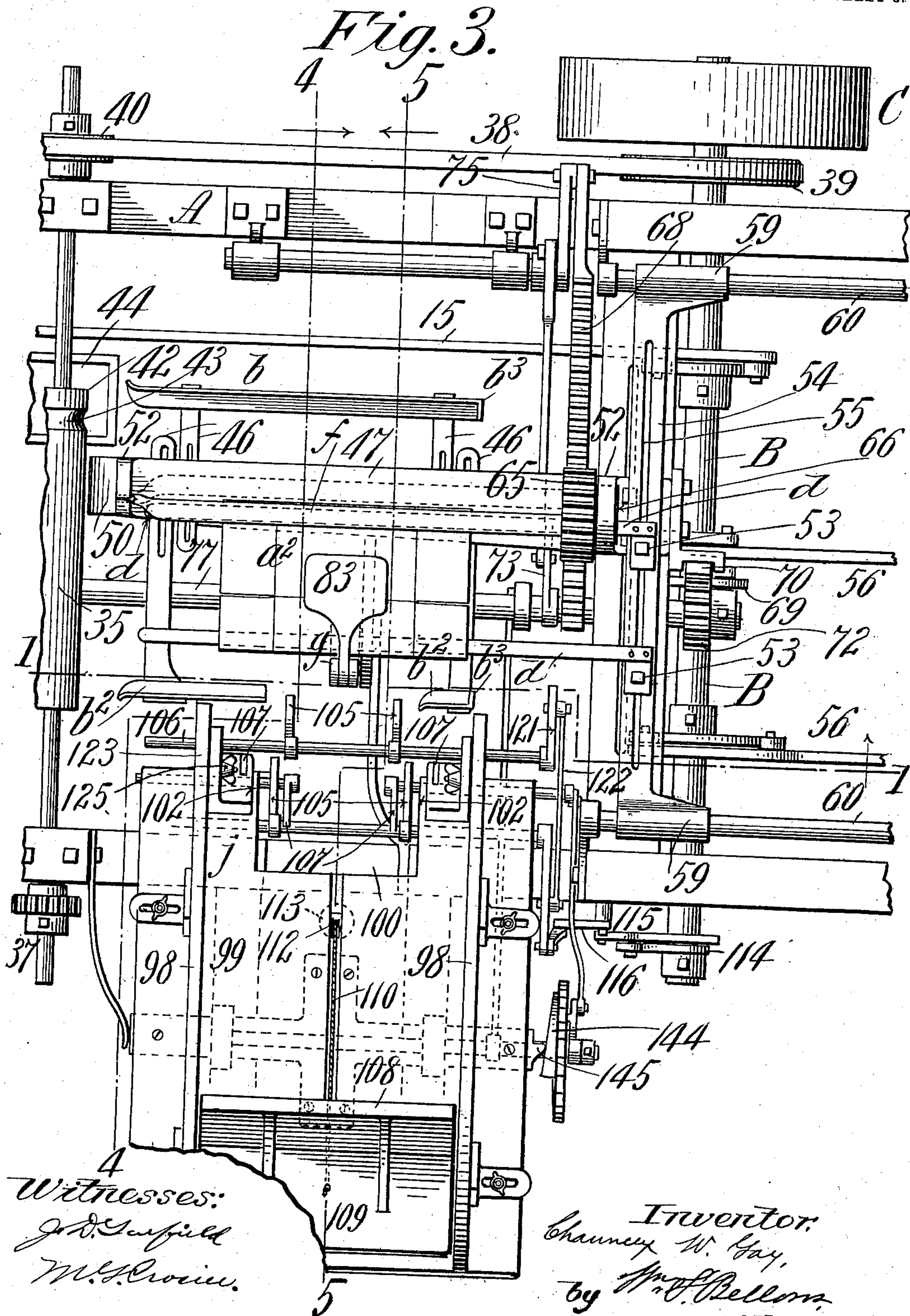
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7 SHEETS—SHEET 3.



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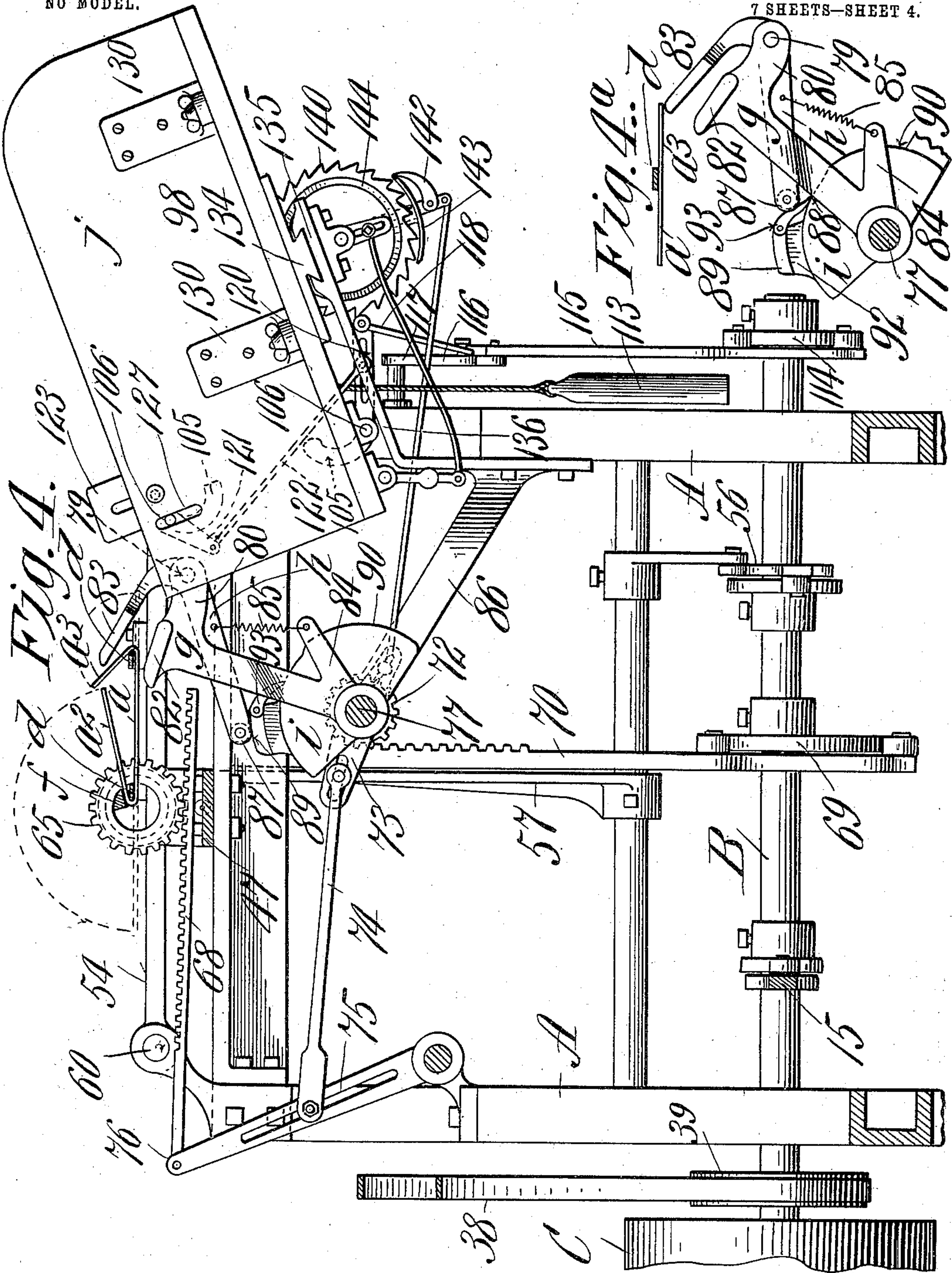
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NO MODEL.

7 SHEETS—SHEET 4.



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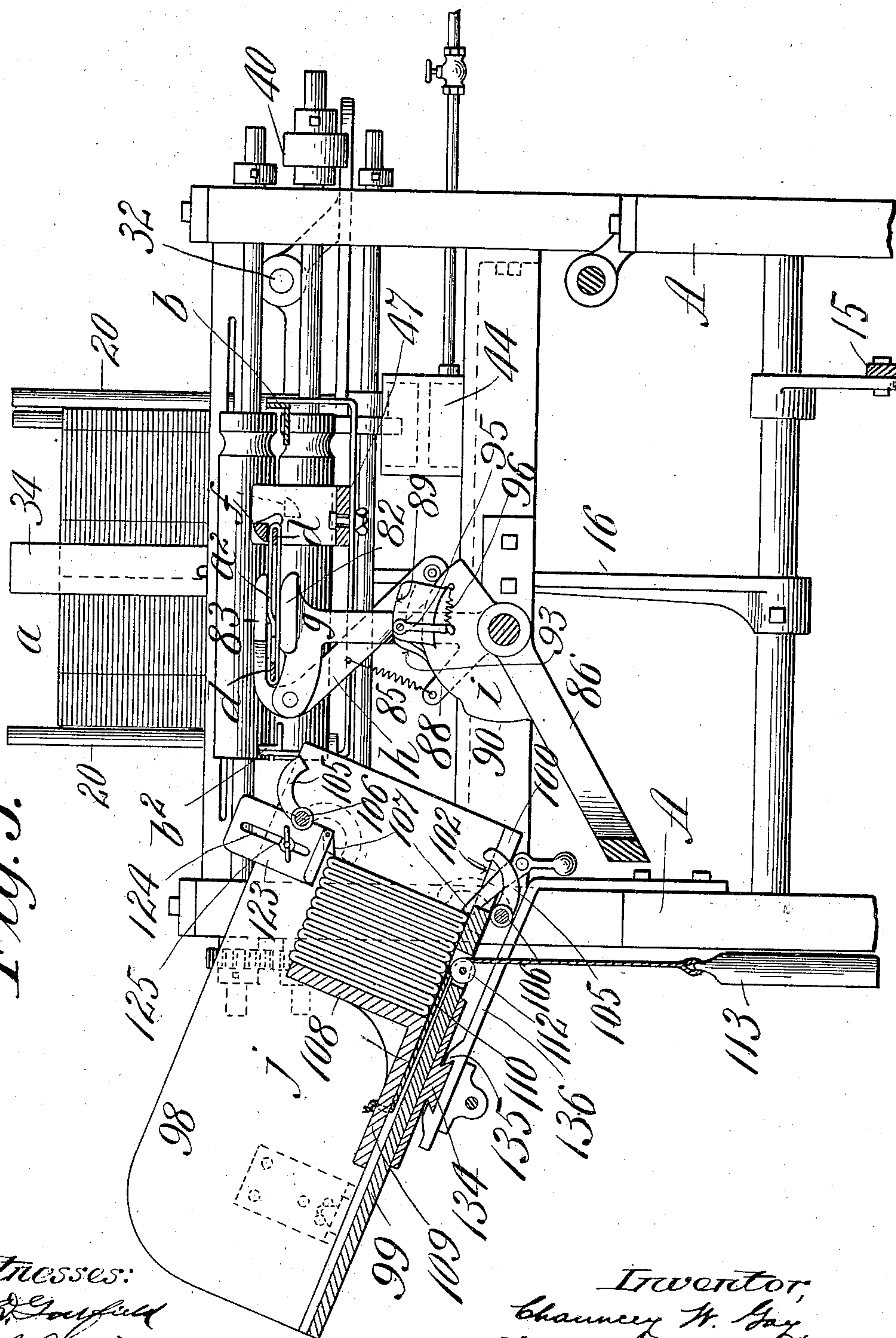
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APPLICATION FILED APR. 13, 1903.

NO MODEL.

7 SHEETS—SHEET 5.

Fig. 5.



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No. 741,324.

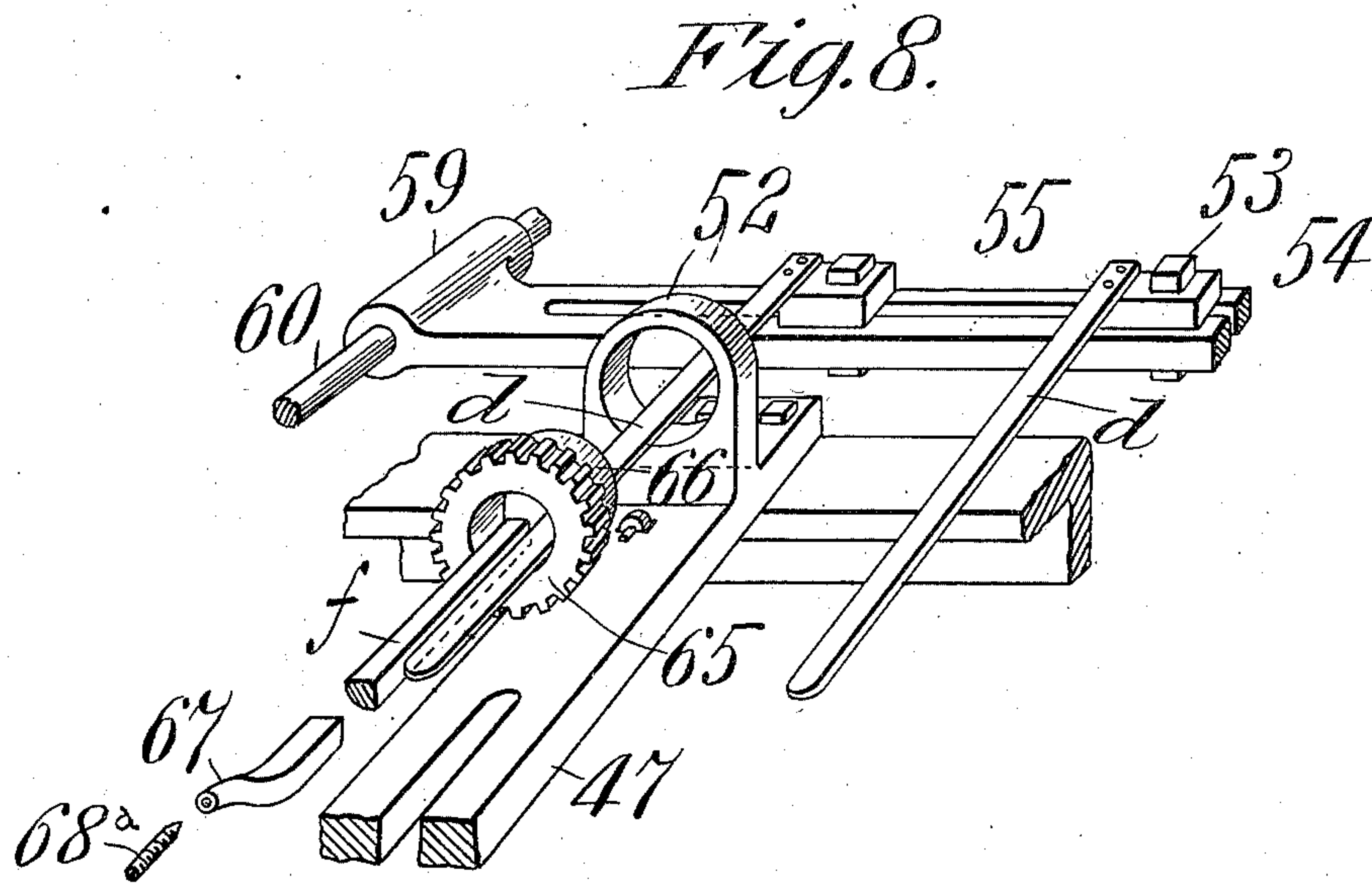
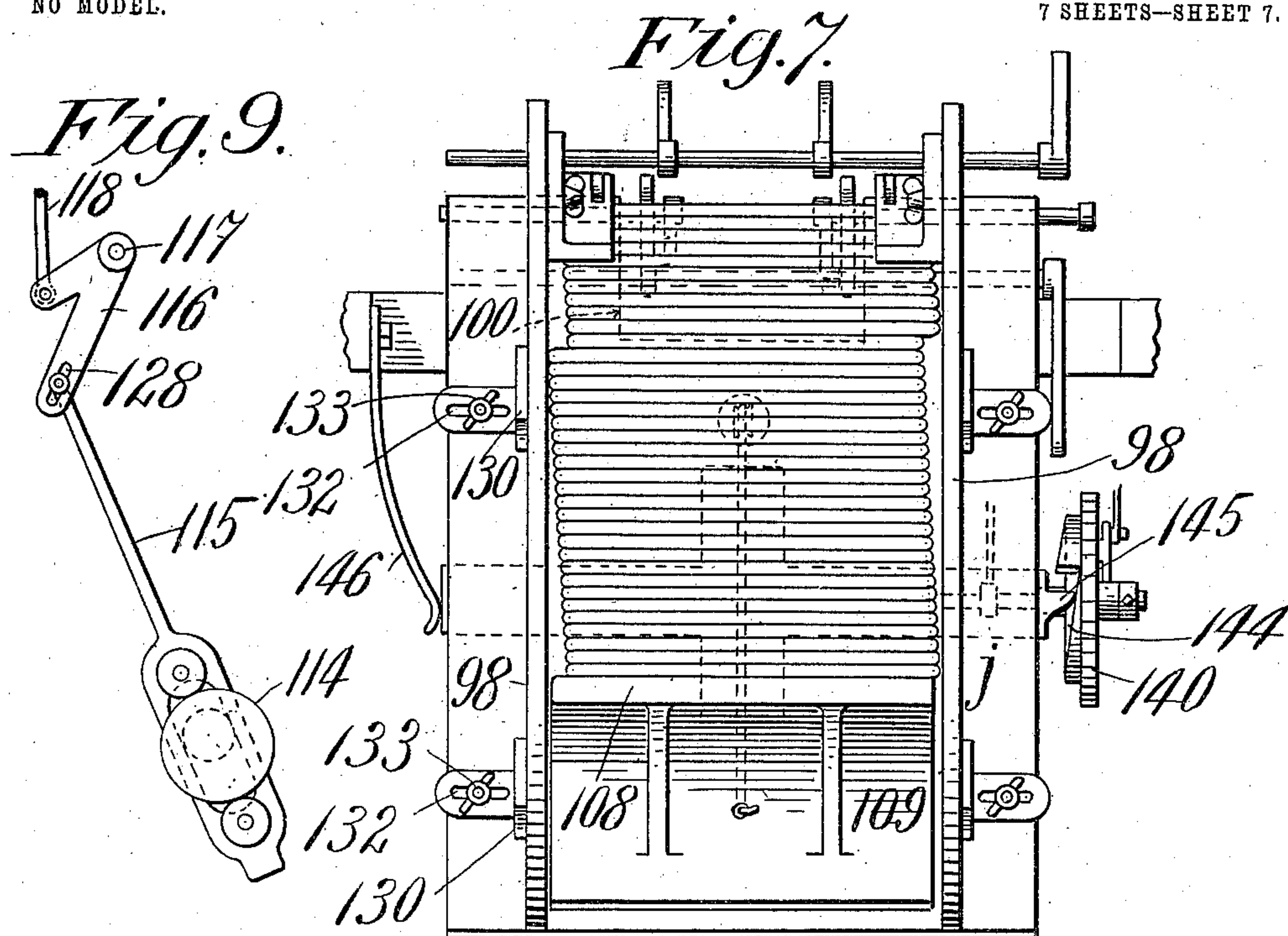
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C. W. GAY.  
PAPER BOX MACHINE.

APPLICATION FILED APR. 13, 1903.

NO MODEL.

7 SHEETS—SHEET 7.



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# UNITED STATES PATENT OFFICE.

CHAUNCEY W. GAY, OF WEST SPRINGFIELD, MASSACHUSETTS.

## PAPER-BOX MACHINE.

SPECIFICATION forming part of Letters Patent No. 741,324, dated October 13, 1903.

Application filed April 13, 1903. Serial No. 152,455. (No model).

*To all whom it may concern:*

Be it known that I, CHAUNCEY W. GAY, a citizen of the United States of America, and a resident of West Springfield, in the county of Hampden and State of Massachusetts, have invented certain new and useful Improvements in Paper-Box Machines, of which the following is a full, clear, and exact description.

10 This invention relates to improvements in paper-box machines of the class in which longitudinally-scored blanks, of cardboard or other appropriate material, constituting the bodies of the boxes, (which are finally to have  
15 in this machine the form of a tubular carton with end flaps thereof left open and in the plane of the sides and ends of the box,) are placed in a pile upon a suitable support therefor, are fed forwardly at regular intervals one  
20 at a time, and brought while in flat condition after having received a marginal line of gum in transit to a place of support properly positioned relatively to means which restrain the intermediate portion of the blank and  
25 relatively to means which impart an overturning or folding action to the opposite side portions of the blank, so that such overturned portions are as to the marginal parts thereof superimposed one thereof on the other, to  
30 be stuck together by reason of the previously-applied adhesive, means preferably appertaining to the devices for overturning one of the side portions of the flap being operative in conjunction with a companion member for  
35 squeezing or pressing the adherent portions of the blank, and while the blank is held in the gripping pressure it is next, by the mechanism still retaining the grip thereon, carried to and discharged into the open end of a receiving-trough, whereat it is released by the  
40 means which had gripped and conveyed the now-formed carton thereto, and by being forced into the receiving-trough with a crowding pressure and against a yielding follower the successively-entered flattened tubular  
45 cartons are held under compression, insuring the setting of the gum or glue between their united overlapping faces, so that there may be no tendency of the cartons to spring or bulge open where intended to be stuck, and  
50 in conjunction with the receiving-trough into which the cartons are brought after having

been gummed, folded, and united an automatic counting mechanism may be employed, so that the edges of bunches of twenty-fives or  
55 other predetermined number of the cartons may be successively offset.

One motive for the production of the present improved carton-making machine is to provide a machine of such character as to  
60 the combination and arrangements of its respective devices which intimately operate on the blanks that adjustments within a considerable range are permitted, whereby the machine is readily available for various small  
65 runs of work which other descriptions of carton-making machines would not be readily adapted to, and the machine is especially adapted to fold and stick longitudinally-scored carton-blanks irrespective of the shape or  
70 dimensions of the end flaps with which the blank may be provided.

Another object is to provide mechanism in the machine which in the overturning or folding operations enable such operations to be  
75 performed with strict precision on two of the longitudinal lines of scoring of the blank corresponding to or coincident with diagonally opposite corners of the set-up box; and the invention consists in the combinations and  
80 arrangements of devices and the constructions of certain of the devices, all substantially as hereinafter sufficiently described in conjunction with the accompanying drawings and covered in and by the claims.

The machine for making paper boxes or cartons organized and constructed in accordance with this invention is illustrated in the accompanying drawings, in which—

Figure 1 is an elevation of the machine as  
90 seen beyond the plane parallel with the line of infeeding of the blanks to the action of the folding mechanism. Figs. 2 and 3 together constitute a plan view, on a scale larger than that of Fig. 1, of the machine. The section-  
95 line 1 1 on the plan indicates the plane in which certain of the parts shown in section in Fig. 1 are taken. Fig. 4 is a sectional elevation as taken on line 4 4, Fig. 3, the overturning or folding actions imparted on opposite  
100 side portions of the blank being here rendered manifest. Fig. 4<sup>a</sup> is a side elevation of a portion of the overturning device for one marginal part of the blank, shown in a posi-



tion where it is previous to the overturning action. Fig. 5 is a sectional elevation as seen in the opposite direction from Fig. 4 and as indicated by the lines 5 5, Fig. 3, the parts which form the overturning of the blank being shown as having completed such operation. Fig. 6 is a view substantially similar to Fig. 5, but showing devices instrumental in forming part of the overturning operation as having moved to convey the carton in flattened tubular form to the receiver, the latter and the crowding device being represented in side elevation. Fig. 7 is a plan view of the receiving-trough and crowding device. Fig. 8 is a perspective view of the movable swords or restraining-blades for the blank and the overturning device for one side portion of the blank. Fig. 9 is a side elevation of a motion-imparting device pertaining to the mechanism for infeeding the blank to the receiving-trough after having been folded and brought to such trough in carton form.

Similar characters of reference indicate corresponding parts in all of the views.

In the drawings, A represents the frame of suitable open-work design to sustain the various supporting portions and movable devices of the machine, and B represents the main shaft shown as arranged to be driven by the pulley C and having mounted thereon cams to actuate the respective movable devices to be hereinafter referred to.

It will be here observed that the blanks  $\alpha$  are piled up at the left-hand portion of the machine as Fig. 1 and the combined Figs. 2 and 3 are viewed, these blanks being fed one at a time from the bottom of the pile while in a flat condition horizontally onto the shelf-like supports  $b$  and  $b^2$ , the latter being separated, as shown in Fig. 3, to give clear space between their ends for the operation or movement therebetween of the adjacent portions of one of the overturning devices, which has an oscillatory movement in a path across the plane of rest of the blank on its folding-support  $b$   $b^2$ , and the blanks coming onto these supports in relation to the restraining and overturning or folding devices are thereafter conveyed (having been folded and caused to assume the form of a flattened carton) in a direction at right angles to the infeed of the blanks to the receiving-trough and caused to have an entering movement thereinto. The blanks are scored previously to being piled within the adjustable gage-posts 20, which rise above the longitudinal slotted bases 22—for instance, as represented in the plan view, Fig. 2—and the forward middle portions of these blanks rest upon a comparatively narrow block or supporting member 23, while the rear portions of the blanks rest on the parallel horizontally-separated plates or sufficiently rigid strips 24 24, which are provided with the adjustable shoulder constituting blocks 25, confined by nuts and bolts in relation to the longitudinal slots 26 in such strips, these slots also permitting, by the bolts 27 and nuts

therefor, approaching or separating adjustments of the strips on the transverse carrier-bar 28, which has the slot 29 along its length, and said carrier-bar has longitudinally-bored hubs 30 at its ends, whereby it has a guiding play on the horizontal studs 32, mounted on the brackets 33 of the frame. The vertically-adjustable escapement-bar 34 regulates the outlet-opening for what become successively the bottom blanks of the pile, which blanks on the reciprocation of the strips 24, having the shoulders 25, are pushed in the proper direction of feed to and between the feed-rollers 35 35, which run them onto the aforementioned shelf-like supports  $b$  and  $b^2$ , gage-stops  $b^3$  being provided at the leading ends of such supports.

The reciprocity movement of the carrier 28 for the shouldered strips 24 is imparted from a cam on the main shaft working against the thrust-rod 15, connected to the pivoted lever 16, which by the link 17 has pivotal connection with the carrier 28.

The feed-rolls 35 are geared together at one end of the arbors thereof, as indicated at 37, and one of the arbors is positively driven by the belt 38, running around the pulleys 39 and 40. One of the feed-rolls has an endwise portion 42 thereof in a line coincident with the flap or portion  $\alpha$  of the blank which is to receive the line of gum or glue to enable it to be stuck after the blank is folded to the flap or portion relatively to which it is superimposed, there being preferably a groove 43 between the gumming portion of the roll and its body or feeding portion, whereby there will be a stoppage of any tendency of the adhesive to flow endwise along the roll. The arbors of the said feed-rolls, one of which has the gumming extension, are elongated beyond the bearings therefor in the frame and are adjustable therethrough, the adjustment being permitted by loosening the collars on the arbors, the driving connection being detachably confined on said arbors, thereby adapting themselves to the axial adjustment. The adjustment of the rolls enables the gumming extension to have its position corresponding to any desired feed-line of the portion of the blank to be gummed and enables the rolls to have such positions relatively to the general line of feed of the blank as to best adapt them for any particular work in progress.

The gum-box 44 is located and supported beneath the gumming portion 42 of the feed-roll, it having a distributing-roll 45 therein carrying gum up therefrom onto the periphery of the aforementioned feed-roll part 42.

The aforementioned shelf-like supporting-strips  $b$   $b^2$  are mounted on horizontal bars 46, slotted and held adjustably for closer-approached or more-separated relations, according to the width of the blanks being worked, on a horizontal supporting-beam 47, which is slotted, and by the bolts and thumb-nuts 48, Fig. 6, permit the adjustments of the gage and support members  $b$   $b^2$  in the direction of



the line of infeed of the blanks, which is at right angles to the line of the adjustments which said gage-supports have toward and from each other. The guiding of the blanks from the feed-rolls 35 onto the said supports therefor is insured by a curved or inclined plate 50, Figs. 1 and 2, which prevent the sagging of the forward end of the blank, whereby it might not ride over the one of the upstanding members 52 52 of the aforementioned beam 47 which is adjacent the feed-rolls.

A pair of blades or swords  $d$   $d$ , having a reciprocatory motion in a horizontal plane just above the level of the blank on the supports  $b$   $b^2$  and in the line of the infeed of the blanks, but having their range of motion at the opposite side of the blank-supports from the location of the supply-pile, are caused to assume their position seasonably over the blanks, these blades being adjusted as to their separation by confining bolts and nuts 53 on the reciprocatory carrier 54 therefor, such carrier having the long slot 55. The blades are to have their outer edges so far separated as corresponds to a certain two of the longitudinal scorings of the blank and for serving as formers around which opposite outer portions of the blank are folded or overturned, so that the foldings will be exactly on the lines of scoring, whereby the corners of the carton will finally be true and square. A reciprocatory movement of the carrier-bar 54 for the swords  $d$  is imparted through the cam-actuated thrust-rod 56, which is pivotally connected to the intermediately-fulcrumed lever 57, the upper end of which, by link 58, has connection with the said carrier 54, and the support and guidance of the carrier is through means of its hollow end hub 59, running on the horizontal supporting-rod 60, this mechanism being characteristically similar to the "shovel-feed" motion aforementioned. The overturnings or foldings of the portions of the blank which in the "flat" extend oppositely beyond the edges of the swords are accomplished by the operation of overturning devices which, as shown, are of specifically different characters, these devices working concurrently, however, to bring the blank from the flat condition, as partially indicated in Fig. 4<sup>a</sup>, to the relations indicated in Fig. 4 and finally to that represented in Fig. 5, and I will now describe the means for overturning what in the present illustrations is represented as the wider outlying portion  $a^2$  of the blank  $a$ .

Suitably below the position to which the wider portion  $a^2$  of the blank outlying beyond one of the swords is brought a revoluble bar  $f$  normally has its location, said bar, as represented in Fig. 8, being carried as a rigid extension and parallel with the axis of an annular gear-wheel 65, the hub 66 of which is journaled in the adjacent upstanding member 52 of the aforementioned supporting-beam 47, and the line of the horizontal bar  $f$  is ec-

centric to the axis of its revoluble movement, coincident with the center of the gear-wheel, and preferably the end portion 67 of the bar 70 opposite from the place of its projection from the gear-wheel is deflected toward the axis of revolution and is pivotally connected at 68<sup>a</sup> in the upstanding lug 52 opposite from the one in which the gear-wheel hub is journaled. The motion of partial revolution of the bar  $f$ —as, for instance, from the position indicated in Fig. 6 and in dotted lines, Fig. 5, to the position represented by full lines in Fig. 5—is imparted by the reciprocatory movement of the rack-bar 68, the teeth of which mesh into the gear-wheel 65, the back-and-forth motion to such bar being imparted primarily from a cam 69, Fig. 4, working against the rack-toothed thrust-bar 70, which meshes into the gear-wheel 72, having, with the radially-slotted arm 73 thereof, the adjustable connection of the connecting-rod 74, which is also adjustably connected with the longitudinally-slotted lever 75, suitably fulcrumed, to the free end of which the rack-bar 68 is pivoted at 76. The gear-wheel 72, operated by the cam-actuating thrust-rod 70, is also instrumental in actuating the overturning device for the other portion  $a^3$  of the blank outlying beyond its adjacent sword oppositely from the normal extension of the blank portion  $a^2$ , which last-mentioned device will be now described. This overturning device comprises a carrier  $g$  in the form of a lever fulcrumed on the rocking arbor 77, on which the aforementioned gear 72 is attached, said carrier-lever having a secondary lever  $h$  intermediately pivoted at 79 on an angular extension 80 of the carrier  $g$ , the portion 82 of such carrier being preferably widened to afford a sufficient bearing-surface under the blank and to receive the impact thereover of the widened portion 83 of the secondary lever  $h$ , which portion 83 is shown as being acute angular to the other portion, which is beyond its pivot. The carrier-lever  $g$  also has an extension 84, between which and the secondary lever  $h$  the spiral spring 85 is connected, said spring exerting the tendency to hold the inner straight member of the secondary lever toward the edge of the cam device  $i$  and to force the member 83 of the secondary lever toward the member 82 of the primary lever. The cam device  $i$  is held stationary as supported by the bracket 86, the same having at the curved working surface thereof with which the roller or stud 87 of the secondary lever  $h$  coacts a portion 88, which is concentric with the center of oscillation of the overturning device and non-effective to cause any swinging of the secondary lever relatively to the carrier-lever, a portion 89, which is decidedly prominent, whereby when the carrier is being swung in one direction the straight arm of the lever  $h$  will ride up thereon, as indicated in Figs 4<sup>a</sup> and 4, thereby insuring an increased distention of the member 83 and an opening thereof away from the carrier



portion 82, and the said cam, furthermore, has located around at the portion of its edge beyond the dead portion 88 in the direction opposite the extreme 89 a slightly-expanded portion 90. The cam has within its side the facewise-opening groove 92, one margin of which is in circular continuation of the contour of the dead portion 88 of the cam, and a pawl 93, pivoted as shown in Figs. 4 and 4<sup>a</sup> and having its position of inclination between the most prominent portion 89 and the dead portion 88 of the cam, serves as a bridging continuation of the cam-surface at the end of and in the plane of the groove 92, being effective to cause the straight arm of the secondary lever to ride up onto the most prominent portion of the cam as the overturning device is having its swinging movement leftward, as viewed in Figs. 4 and 4<sup>a</sup>. The prominent portion 89 of the cam under or within which is the aforementioned groove 92 is of such partial length relatively to the path of movement of the coacting oscillatory devices that when the latter have reached the extreme of the leftward movement the working stud or roller 87 will have ridden down at the back end of the cam protuberance 89, so that on the reversed and rightward movement the part 87 instead of riding back up over the cam protuberance 89 has its transit through the groove, the cam relatively thereto for the greater portion of the reversed oscillatory motion being non-effective to force the member 83 away from the portion 82, although it will be perceived that as the cam portion 90 is reached by the lever roller-stud the lever has imparted thereto automatically a degree of movement sufficient to open the part 83 from the part 82 for the release of the blank.

As shown in Figs. 5 and 6, the pawl-like cam continuing or bridging member 93 has on its affixed pivot which is journaled in the cam-body a little lever 95, to which a spring 96 has a reactive stress, so that the point of the inclined pawl member will normally be against the edge of the cam, and yet the roller-stud of the secondary lever on its retreating movement through the groove may click past the spring-pawl.

The scored blank brought onto the shelf-like supports  $b$   $b^2$  in the flat condition, the overturning device, comprising carrier  $g$  and secondary lever bodily movable concurrently therewith and having the swinging movements additional thereto and independently thereof, as described, have initially the relative position shown in Fig. 4<sup>a</sup>, the straight-edged swords being projected in parallel lines over and closely to the face of the blank, with their outer edges coincident with two of the lines of scoring, and the revoluble bar  $f$  having at this time its position below the side portion of the blank opposite to the portion under which the overturning device  $g$   $h$  has its location the operations of these devices are, as perceived in Fig. 4, to overturn the

wide outlying portion  $a^2$  of the blank by the said revoluble bar  $f$  and to also overturn the gum portion  $a^3$  of the blank by the impingement thereagainst of the contacting jaw 83 of lever  $h$  thereagainst, and now while the bar  $f$  remains stationary for a proper interval the roller-stud 87, riding down off of the highest hump 89 of the cam, insures the spring-retracted lever member  $h$  to have its jaw 83 exert a gripping action on the superimposed overturned portions and bottom layer of the blank, as represented in Fig. 5, so that on the reverse motion of the carrier  $g$ , whereby it moves from the position Fig. 5 to the position Fig. 6, the blank will be carried bodily to the open end of the receiving-trough  $j$ ; but just previous to such conveyance of the carton and in order that the bodily movement of the latter may not be obstructed by the swords around which the blank has been wrapped, as rendered manifest, the swords are carried endwise to the extreme of their motion, so that they are entirely withdrawn from within the carton, one sword having its thrust through the annular gear-wheel 65.

The trough  $j$  comprises opposite side boards 98 98 and base 99, having a recess 100 at its end, toward which the conveyer has its movement, such recess being best seen in Figs. 3, 5, and 7, in which it is perceived that this centrally-formed recess is of less width than the width of the base-board of the trough, whereby opposite side ledges 102 102 are provided, onto which the lower edge of the carton comes to bearing at a time about concurrent with the releasing of the gripping members of the carrier, which releasing, as pointed out, is occasioned by the action of the slightly-expanded cam portion 90 relatively to the roller-stud of lever  $h$ . In Fig. 6 the gripping-jaws of the carrier device are shown as having the releasing separation above mentioned.

The device comprising parts  $g$  and  $h$ , operative as the overturner for one side portion of the blank and as the carrier for the carton, has working in conjunction therewith and properly timed pairs of infeeding-arms 105, mounted on rock-shafts 106 106, transversely of and above and below the open receiving end of the trough  $j$ , rocking movements being imparted to said shafts, whereby the infeeding-arms are out of the course of movement of the carton when the latter is being brought into the receiving-trough and whereby immediately thereafter such arms are swung from above and below against the rear side of the carton near its upper and lower edges to force it facewise along into the trough past the clicks or detents 107 107, which restrain it against tilting or falling facewise onto the trough from its edge-supported position, and a follower 108 is provided in the trough, which backs against a member having a yielding resistance as the cartons are one after another brought into the trough, such yielding resistance imposing a pressure on the overlapped and stuck layers of the



cartons to insure the setting of the adhesive. The follower comprises an upstanding member and a base member 109, to which a weighted cord 110 is attached, an intermediate portion of such cord being guided by the sheave 112 from its horizontal course of draft on the follower in a direction toward the receiving end of the trough to its downward extension, at which the weight 113 is provided.

The rock-shaft carrying the lower pair of infeeding-arms 105 has rocking reciprocatory motion imparted thereto by the cam 114, Figs. 4 and 9, operating against the thrust-rod 115, which is connected to the angular lever 116, having the pivotal mounting 117 at its elbow, while to the other arm of this angular lever, from which the rod 115 is connected, a connecting-rod 118 is secured, such rod being also connected to a lever-arm 120, fixed to and extended angularly from the lower rock-shaft 106. The upper rock-shaft, carrying the upper pair of infeeding-arms, has a radial fixed arm 121, linked by the rod 122, so that the one system of cam-actuated devices or connections simultaneously and properly impart the back-and-forth swinging motions to the upper and lower pairs of infeeders. The upper rock-shaft for the infeeders is journaled in the side brackets 123, which are vertically adjustable on the side walls of the trough by reason of the slots 124 therein and the bolts 125, provided with confining-nuts, and the so journaled and adjustable rock-shaft is permitted to have its vertical movements of adjustment by the provision of slots 127 in the trough side wall.

The thrust-rod 115 has its connection with the angular lever 116 made an adjustable one by the provision of the slot 128 in the lever, at the margins of which the rod has a clamping bind, and a similar adjustable connection is made between the link-rod 122 and the lever-arm 120 of the lower rock-shaft, so that the connections will not interfere with the elevation or the lowering of the upper infeeding device.

The upstanding side walls of the receiving-trough are adjustable toward and from each other while remaining in parallel planes by reason of the fact of their being made separately from the trough-base and having angular lugs 130, the bases of which have the slots 132, receiving through them the stems of the bolts 133, for which confining-nuts are provided for the clamping bind. The base of the receiving-trough has an attached depending dovetail rib fitted in a dovetail way 135 of the supporting-bracket 136, and the usual automatic intermittently-operating sidewise-shifting mechanism for the trough is provided substantially of the same character as common and well-known as the "counter" of envelop-machines, whereby the trough has slight "hitching" sidewise motions repeated twenty-five or other number of times to offset the cartons received in the trough in bunches of twenty-five or other predeter-

mined number, as indicated in the plan view in Fig. 7.

The ratchet-wheel 140, with which the properly-reciprocated pawl 142 coacts, the pick or working thrust of which pawl is regulated by the shield 143, has the face-cam 144, that crowds against the lug 145, which is as a part of the base of the trough, the trough having its sidewise movement, as cam-impelled, gradually against the spring 146, which after the cam has completely rotated oppositely shifts the trough for the commencement of a new counting.

Having thus described my invention, what I claim, and desire to secure by Letters Patent, is—

1. In a paper-box machine, the combination with a horizontal support for a blank, and means for feeding a blank forwardly onto said support, of a part having a portion beyond said support opposite from said feeding means, and means for reciprocating it over said support for restraining an intermediate portion of the blank thereon, and for forwardly withdrawing it from over said support, means for overturning one side portion of the blank, means for overturning the other side portion of the blank, marginally superimposed on the first overturned portion, a gripper for clamping the carton and carrying it from said support in a direction transversely relatively to the common line of movement of the feeding means, and said restraining part.

2. In a paper-box machine, the combination with a horizontal support for a blank, and means for feeding blanks onto said support from the rear thereof, of a reciprocatory device for restraining an intermediate portion of the blank thereon, located endwise opposite from the feeding means, movable in a plane adjacent and parallel with that of said support, means for overturning one side portion of the blank, means for overturning the other side portion of the blank marginally superimposed on the first overturned portion, means for imparting the reciprocatory movements to said restraining device whereby it is drawn from within the carton, and for returning it to its position relatively to said support, a receiving-trough, located sidewise relatively to the movements of the feeding means and of said reciprocatory restraining device, a device for carrying the carton from its folding-support transversely to said trough, and automatically-operating means for moving the carton into the trough.

3. In a paper-box machine, the combination with a support for blanks, and means for feeding the blanks successively onto said support, of a reciprocatory device for restraining an intermediate portion of the blank thereon, located endwise in the line of the feeding means, oppositely therefrom, and movable in a plane adjacent and parallel with that of said support, means for overturning one side portion of the blank, means for overturning



the opposite side portion of the blank, marginally superimposed on the first overturned portion, means for imparting the reciprocatory movements to said restraining device whereby it is drawn from within the carton, and for returning it to its position relatively to said support, a receiving-trough, a device for carrying the carton from its folding-support to said trough, and automatically-operating means for moving the carton into the trough, and detent-pawls provided at upper and lower portions of the trough part past which the carton is moved by the infeeding members.

4. In a paper-box machine, the combination with a horizontal support for a blank, of a reciprocatory device for restraining an intermediate portion of the blank thereon, movable in a plane adjacent and parallel with that of said support, means for overturning one side portion of the blank, means for overturning the other side portion of the blank, marginally superimposed on the first overturned portion, means for imparting the reciprocatory movements to said restraining device whereby it is drawn from within the carton, and for returning it to its position relatively to said support, a receiving-trough, a yielding member therein, a gripping-carrier for conveying the carton from said support to said trough, infeeding members for forcing the cartons successively into the trough against the resistance of said yielding member, and detent devices past which the carton is forced by the infeeding members.

5. In a paper-box machine, the combination with a support onto which the flat blank may be brought, of a pair of parallel blades and a carrier therefor, and means for reciprocating same whereby the blades are moved in a plane adjacent and parallel with said support to position over intermediate portions of the blank, and away from such position, a horizontal bar and a rotatable support on which said bar is revolubly carried across the plane of the blank in a curved course, and means for imparting rotational movement to said rotatable support for the bar.

6. In a paper-box machine, the combination with a support onto which the flat blank may be brought, of a pair of parallel blades and a carrier therefor, and means for reciprocating same whereby the blades are moved in a plane adjacent and parallel with said support to position over intermediate portions of the blank and away from such position, a horizontal bar arranged parallel with the length and line of movement of said blades, and an annular rotatable support by which said bar is revolubly carried across the plane of the blank in a curved course, through the opening in which one of said blades endwise moves, and means for imparting rotational movement to said rotatable support for the bar.

7. In a paper-box machine, the combination with a support onto which the flat blank may be brought, of a pair of parallel blades and a

carrier therefor, and means for reciprocating same whereby the blades are moved in a plane adjacent and parallel with said support to position over intermediate portions of the blank and away from such position, a horizontal bar and a gear-wheel from which said bar is extended in a line eccentric to, but parallel with the axis of said wheel, and by which said bar is revolubly carried across the plane of the blank in a curved course, a rack-bar meshing with said gear-wheel, and means for reciprocating the rack-bar.

8. In a paper-box machine, the combination with a support onto which the scored blank may be brought, of a pair of parallel reciprocatory blades, means for sliding them over and away from over the blank on the said support, a stationary support 47 having opposite members 52 52, one of which is apertured, the gear-wheel 65 having a hub journaled in the aperture in one of said members 52, and having an opening through it and its hub, through which one of said blades has its endwise motion, and said gear-wheel carrying a bar extended from a point eccentric to its axis, and in a line parallel with its axis, and having its end opposite the gear deflected to the gear-axis, and pivotally engaged with the other supporting member 52, and a cam-actuated rack-bar engaging said gear-wheel.

9. In a paper-box machine, the combination with a support onto which the scored blank may be brought, comprising horizontal members  $b$ , and alined, but endwise separated members  $b^2 b^2$ , and provided with the end gage-stops  $b^3$ , said support members  $b$  and  $b^2 b^2$  being adjustable horizontally toward and from each other, and adjustable in the direction of their lengths, of a pair of parallel reciprocatory blades, means for sliding them over and away from over the blank on the support, the stationary support having opposite members 52 52, one of which is apertured, the gear-wheel 65 having a hub journaled in the aperture in one of said members 52 and having an opening through it and its hub through which one of said blades has its endwise motion, and said gear-wheel having a bar extended from a point eccentric to its axis and in a line parallel with its axis and having its end opposite the gear deflected to its axis and pivotally engaged with the other supporting member 52, and a cam-actuated rack-bar engaging said gear-wheel.

10. In a paper-box machine, the combination with a support onto which the flat blank may be brought, of a pair of parallel blades and a carrier therefor, and means for reciprocating same whereby the blades are moved in a plane adjacent and parallel with said support to position over intermediate portions of the blank and away from such position, a horizontal bar and a rotatable support on which said bar is revolubly carried across the plane of the blank in a curved course, means for imparting rotational movement to



said rotatable support for the bar, and a further oscillatory overturning device operable to overturn the marginal portion of the blank opposite the portion against which said revoluble bar operates.

11. In a paper-box machine, the combination with a support onto which the flat blank may be brought, comprising opposite side members with gage-stops at their leading ends, which members are adjustable toward and from each other, and also adjustable in the direction of their lengths, of a pair of parallel blades and a carrier therefor, on which said blades are adjustable toward and from each other, and means for reciprocating said carrier, a horizontal bar and a rotatable support on which said bar is revolubly carried across the plane of the blank in a curved course, means for imparting a rotational movement to said rotatable support for the bar, and a further oscillatory overturning device operable to fold the marginal portion of the blank opposite the portion against which said revoluble bar operates upon the latter.

12. In a paper-box machine, the combination with a support onto which the flat blank may be brought, means for feeding a blank onto said support and a gumming-roll operable to marginally gum the blank in its feeding movement onto said support, of a pair of parallel blades and a carrier therefor, and means for reciprocating same whereby the blades are moved in a plane adjacent and parallel with said support to position over intermediate portions of the blank and away from such position, a horizontal bar and a rotatable support on which said bar is revolubly carried across the plane of the blank in a curved course, and means for imparting rotational movement to said rotatable support for the bar.

13. In a paper-box machine, the combination with a support onto which the flat blank may be brought, a blade and a carrier therefor, and means for reciprocating same whereby the blade is moved in a plane adjacent and parallel with said support to position over an intermediate portion of the blank and away from such position, a horizontal bar and a rotatable support on which said bar is revolubly carried across the plane of the blank in a curved course, means for imparting rotary reciprocatory movements to said rotatable support for the bar, and means for successively feeding blanks onto said support.

14. In a paper-box machine, the combination with a blank-pile support, a support onto which the flat blanks may be successively brought from the pile to be folded, means for feeding the blanks individually from the pile to the folding-support, and a gumming-roll, subject to the action of which the blank has its movement from the pile to said folding-support, of a pair of parallel blades and a carrier therefor, and means for reciprocating same whereby the blades are moved in a

plane adjacent and parallel with said support to position over intermediate portions of the blank and away from such position, a horizontal bar and a rotatable support on which said bar is revolubly carried, lengthwise across the plane of the blank in a curved course, means for imparting rotatory reciprocatory movements to said support for the bar, and a further oscillatory overturning device having a companion member relatively to which it has an opening and closing movement, and operable to overturn the marginal portion of the blank opposite the portion against which said revoluble bar operates, and to withdraw the blank from the folding-support.

15. In a paper-box machine, the combination with a support onto which the blank may be brought, of a pair of parallel reciprocatory blades movable over and away from over the support, and means for moving them, a device for folding one marginal portion of the blank over one of the blades, an oscillatory device operable to fold the other marginal portion of the blank over the other blade, and having a companion jaw-constituting member between which and the overturning member the carton may be gripped, and means for imparting the oscillatory movements to said second-named overturning device whereby, following its overturning action, it conveys the carton off from the folding-support.

16. In a paper-box machine, the combination with a support onto which the blank may be brought, of a pair of parallel reciprocatory blades movable over and away from over the support, and means for moving them, a device for folding one marginal portion of the blank over one of the blades, an oscillatory device operable to fold the other marginal portion of the blank over the other blade, and having a companion jaw-constituting member between which and the overturning member, the carton may be gripped, and means for imparting the oscillatory movements to said second-named overturning device, and a cam by which one of the movable members of the oscillatory devices has its opening and closing movement relatively to its companion member.

17. In a paper-box machine, the combination with a support onto which the blank may be brought, and a mechanism for feeding blanks onto said support, of a pair of parallel reciprocatory blades movable over and away from over the support, and means for moving them, a device for folding one marginal portion of the blank over one of the blades, an oscillatory device operable to fold the other marginal portion of the blank over the other blade, and having a companion jaw-constituting member between which and the overturning member, the carton may be gripped, and means for imparting the oscillatory movements to said second-named overturning device whereby following its over-



turning action it conveys the carton off from the folding-support, and a trough to which the oscillatory device conveys the carton, and a cam for releasing the carton-gripping jaw members of said oscillatory device, one from the other.

18. The combination with separated folding-support members for a blank, of the carrier-bar 54, the pair of rods 60 on which the carrier-bar has supporting engagements, the cam-actuated thrust-rod 56, the lever 57 thereto connected, and linked to the carrier-bar 54, the pair of blades horizontally lengthwise extended in parallelism and in a plane parallel with and adjacent that of the blank-receiving surface of said separated blank-supports, and means for overturning opposite marginal portions of the blank operative adjacent the outer edges of said blades.

19. The combination with parallel separated folding-support members for a blank, adjustable toward and from each other, of the carrier-bar 54, the pair of rods 60 provided with the tubular end hubs having runner engagements on said rods 60, a cam and connections between it and said bar, for reciprocating the latter, the pair of blades horizontally lengthwise extended in parallelism and in a plane parallel with and adjacent that of the blank-receiving surface of said separated blank-supports, and adjustable in parallelism on said carrier-bar 54 toward and from each other, and means for overturning opposite marginal portions of the blank, individually operative adjacent the outer edges of said blades.

20. In a paper-box machine, the combination with a blank-support, of a blank-restraining member arranged to overlie an intermediate portion of the blank, a device mounted for an oscillatory movement and comprising a carrier member and a secondary member movable bodily with the carrier and connected thereto for an independent movement relatively to the carrier, and a cam with which the oscillatory device coacts operative on the secondary member thereof to impart its independent motion thereto, effective in the overturning of the marginal portion of the blank relatively to the restraining member.

21. In a paper-box machine, the combination with a blank-support, of a blank-restraining member arranged to overlie an intermediate portion of the blank, a device mounted for an oscillatory movement and comprising a carrier member and a secondary member movable bodily with the carrier and pivotally connected thereto for an independent movement relatively to the carrier, a gear-wheel affixed on the carrier member and a cam-actuated thrust-bar meshing with said gear-wheel, and a stationary cam with which the secondary member of the oscillatory device coacts.

22. In a paper-box machine, the combination with a blank-support, of a pair of reciprocatory blank-restraining blades arranged to

overlie intermediate portions of the blank, and to be withdrawn from such positions, an oscillatory device and comprising a carrier member *g* and secondary member *h* movable bodily with the carrier member and pivotally connected thereto for a movement independent of its oscillation with the carrier, a cam with which the secondary member coacts, substantially as described, and a bar mounted for, and having means for imparting, its revoluble movement in a course across the portion of the blank opposite from that at which said oscillatory device coacts.

23. In a paper-box machine, the combination with a folding-support for blanks and a restraining member operable relatively to an intermediate portion of the blank, of the carrier-lever *g* fulcrumed for oscillation and having a jaw 82 at the extremity thereof toward said folding-support and restraining member, means for oscillating the carrier-lever, a secondary lever *h* pivotally supported by, and having a swinging movement relatively to the carrier and having at its extremity the jaw member 83 arranged to open from, and close against the jaw 82 and a cam with which the secondary lever coacts operable relatively to the latter to swing its jaw member 83 away from the jaw 82, and in a direction intersecting the plane of the blank, for the purpose set forth.

24. In a paper-box machine, the combination with a folding-support for blanks and a restraining member operable relatively to an intermediate portion of the blank, of the carrier-lever *g* fulcrumed for oscillation and having a jaw 82 at the extremity thereof, toward said folding-support and restraining member, means for oscillating the carrier-lever, a secondary lever *h* pivotally supported by and having a swinging movement relatively to the carrier, and having at its extremity the jaw member 83 arranged to open from, and close against, the jaw 82, and a cam with which the secondary lever coacts operable on the latter to swing its jaw member 83 away from the jaw 82, and in a direction intersecting the plane of the blank and a retracting-spring connected to members of the carrier and the secondary lever.

25. In a paper-box machine, the combination with a folding-support for blanks and a restraining member operable relatively to an intermediate portion of the blank, of the carrier-lever *g* fulcrumed for oscillation and having a widened jaw 82 at the extremity thereof toward said folding-support and restraining member, and having the arm 80, means for oscillating the carrier-lever, a secondary lever *h* of angular form pivoted at its elbow to said arm 80, and having at its outer extremity, the widened jaw 83 arranged to open from, and close against, the jaw 82, a cam with which the inner end of the secondary lever coacts, and a spring operable on the secondary lever to swing the jaw 83 toward the jaw 82.



26. In a paper-box machine, the combination with a folding-support for a blank and a restraining member operable relatively to an intermediate portion of the blank, of the carrier-lever *i* mounted for oscillation, with means for oscillating it, and having a jaw member, the secondary lever pivotally mounted on the carrier, having a jaw member arranged to open and close relatively to the carrier-jaw, and having a cam-bearing member, and a cam having a concentric portion and a portion inclined relatively to the path of oscillation of the cam-bearing member of the secondary lever.

27. In a paper-box machine, the combination with a folding-support for a blank and a restraining member operable relatively to an intermediate portion of the blank, of the carrier-lever *i* mounted for oscillation, with means for oscillating it, and having a jaw member, the secondary lever pivotally mounted on the carrier, and having the jaw member arranged to open and close relatively to the carrier-jaw, and having a cam-bearing member, and a cam having a concentric portion and portions at opposite sides of the concentric members, inclined relatively to the path of oscillation of the cam-bearing member of the secondary lever, whereby the movable jaw on one forward motion of its carrier, will have swinging movement away from the carrier-jaw, will be permitted to close toward said jaw, and will have a final releasing movement from the carrier-jaw.

28. In a paper-box machine, the combination with a folding-support for a blank and a restraining member operable relatively to an intermediate portion of the blank, of the carrier-lever *i* mounted for oscillation, with means for oscillating it, and having a jaw member, the secondary lever pivotally mounted on the carrier, and having the jaw member arranged to open and close relatively to the carrier-jaw, and having a cam-bearing member, and a cam having a concentric edge portion, and an outwardly-extended portion 89 having a groove separating it from a concentric continuation of the cam-rim therewithin, and having the inclined pivoted cam-continuing pawl 93 at one of the open ends of the said groove, for the purposes set forth.

29. In a paper-box machine, the combination with a folding-support for a blank and a restraining member operable relatively to an intermediate portion of the blank, of the carrier-lever *i* mounted for oscillation, with means for oscillating it, and having a jaw member the secondary lever pivotally mounted on the carrier, and having the jaw member arranged to open and close relatively to the carrier-jaw, and having a cam-bearing member, and a cam having a concentric edge portion, and an outwardly-extended portion 89 having a groove separating it from a concentric continuation of the cam-rim therewithin, and having the inclined pivoted cam-continuing pawl 93 at one of the open ends of the

said groove, said pawl having a pivot to which it is fixed, journaled in the cam and having a radial arm, and a spring engaged in said radial arm.

30. In a paper-box machine, the combination with a folding-support for a blank and a restraining member operable relatively to an intermediate portion of the blank, of the carrier-lever *i* mounted for oscillation, with means for oscillating it, and having a jaw member, the secondary lever, pivotally mounted on the carrier, and having the jaw member arranged to open and close relatively to the carrier-jaw, and having a cam-bearing member, and a cam having a concentric edge portion, an outwardly-extended working portion 89 having a groove separating it from a concentric continuation of the cam-rim therewithin, and having the inclined pivoted cam-continuing pawl 93 at one of the open ends of the said groove, and said cam having the outwardly-extended working portion 90 at a point around its rim removed from the working portion 89.

31. In a paper-box machine, the combination with a folding-support for a blank and a restraining member operable relatively to an intermediate portion of the blank, of the carrier-lever *i* mounted for oscillation, with means for oscillating it, and having a jaw member, the secondary lever, pivotally mounted on the carrier, and having the jaw member arranged to open and close relatively to the carrier-jaw, and having a cam-bearing member, and a cam having a concentric edge portion, and the working portion 89, having a groove separating it from a concentric continuation of the cam-rim therewithin, having the inclined pivoted cam-continuing pawl 93 at one of the open ends of the said groove, and having the working cam-surface 90 removed from the working portion 89, a receiving-trough between which and the folding-support and restraining member, the oscillatory carrier operates, infeeding members provided at the opening end of the trough and means for reciprocating same.

32. In a paper-box machine, the combination with the folding-support, the reciprocatory restraining-blades, and the revoluble bar *f*, of the carrier-lever *g*, having a gear-wheel 72 and a support on which the gear-provided carrier is mounted, a rotary cam 69, and a rack-toothed thrust-rod engaged by the cam and meshing into the said gear-wheel 72.

33. In a paper-box machine, the combination with the folding-support, the revoluble bar *f* and the gear-wheel 65, by which the same is carried, of the carrier-lever *g*, having a gear-wheel 72, and a support on which the gear-provided carrier is mounted, a rotary cam 69, a rack-toothed thrust-rod engaged by the cam, and meshing into the gear-wheel 72, a radial arm 73, arranged to swing in consonance with the oscillation of the carrier, a lever 75, a rod 74, connecting in the arm 73, and said lever 75, and the rack-bar 68 con-



connected with the lever and meshing with said gear-wheel 65.

34. In a paper-box machine, the combination with the folding-support, the reciprocatory restraining-blades, and the revoluble bar *f* and hollow gear-wheel 65 by which the same is carried, and through which one of said blades is endwise movable as described, of the carrier-lever *g*, having a gear-wheel 72 and a support on which the gear-provided carrier is mounted, a rotary cam 69, a rack-toothed thrust-rod engaged by the cam, and meshing into the gear-wheel 72, a radial arm 73 swinging in consonance with the oscillation of the carrier, a lever 75, a rod 74, connecting in the arm 73, and said lever and the rack-bar 68 connected with the lever and meshing with the gear-wheel 65, and means for imparting a reciprocatory movement to said blades in a plane adjacent the folding-support.

35. In a paper-box machine, the combination with the folding-support, the reciprocatory restraining-blades, a device for overturning one side portion of the blank, a device for overturning the opposite side portion of the blank, comprising the oscillatory carrier *g*, and the secondary lever *h*, and a cam controlling the actions of the secondary lever, as described, of the receiving-trough having side portions 102 at the bottom of its receiving end, intersecting the course of the carton brought thereagainst by the oscillatory carrier, and having the intermediate recess 100.

36. In a paper-box machine, the combination with the folding-support, the reciprocatory restraining-blades, a device for overturning one side portion of the blank, a device for overturning the opposite side portion of the blank, comprising the oscillatory carrier *g* and the secondary lever *h*, and a cam controlling the actions of the secondary lever, as described, of the receiving-trough having side portions 102 at the bottom of its receiving end, intersecting the course of the carton brought thereagainst by the oscillatory carrier, and having the intermediate recess 100, curved infeeding members 105 mounted for oscillation near the bottom and at upper portions of the receiving extremity of the trough, and means for imparting the oscillatory movements periodically to said infeeding members.

37. In a paper-box machine, the combination with the folding-support, the reciprocatory restraining-blades, a device for overturning one side portion of the blank, a device for overturning the opposite side portion of the blank, comprising the oscillatory carrier *g* and the secondary lever *h*, and a cam controlling the actions of the secondary lever, as described, of the receiving-trough having side portions 102 at the bottom of its receiving end, intersecting the course of the carton brought thereagainst by the oscillatory carrier, and having the intermediate recess 100 and upper and lower sets of restraining-detents 106 and 107 provided within the trough.

38. In a paper-box machine, the combination with the folding-support, the reciprocatory restraining-blades, a device for overturning one side portion of the blank, a device for overturning the opposite side portion of the blank, comprising the oscillatory carrier *g* and the secondary lever *h* and a cam controlling the actions of the secondary lever, as described, of the receiving-trough having side portions 102 at the bottom of its receiving end, intersecting the course of the carton brought thereagainst by the oscillatory carrier, and having the intermediate recess 100, upper and lower sets of restraining-detents 106 and 107 provided within the trough, curved infeeding members 105 mounted for oscillation near the bottom and at upper portions of the receiving extremity of the trough, and means for imparting the oscillatory movements periodically to said infeeding members.

39. In a paper-box machine, the combination with the folding-support, the reciprocatory restraining-blades, a device for overturning one side portion of the blank, a device for overturning the opposite side portion of the blank, comprising the oscillatory carrier *g* and the secondary lever *h*, and a cam controlling the actions of the secondary lever, as described, of the receiving-trough having side portions 102 at the bottom of its receiving end, intersecting the course of the carton brought thereagainst by the oscillatory carrier, and having the intermediate recess 100, upper and lower sets of restraining-detents 106 and 107 provided within the trough, curved infeeding members 105 mounted for insulation near the bottom and at upper portions of the receiving extremity of the trough, means for imparting the oscillatory movements periodically to said infeeding members, the member 108 slidable along the receiving-trough and means for imparting a yielding pressure to said member 108 in a direction toward the receiving end of the trough.

40. In a paper-box machine, the combination with a receiving-trough and means for overturning a marginal portion of a blank, and for gripping and conveying the folded blank to the trough, of upper and lower rockshafts having pairs of infeeding members and having the lever-arms 120, one of which is slotted, and one said rock-shaft being bodily adjustable vertically relatively to the trough, a link connected to one lever-arm, and adjustably connected to the slotted lever-arm, cam-actuated connections operative on one of the rock-shaft levers, and upper and lower sets of detents, the upper set of which are vertically adjustable relatively to the trough.

41. In a paper-box machine, the combination with a support onto which flat blanks may be fed, of a support for a pile of blanks, a mechanism for pushing the lowermost blank of the pile toward the first-named support, a pair of feed-rolls to the action of which the blank is pushed, one said roll having an end-



wise-located gumming extension, a gum-re-  
ceptacle, and a roller for conveying gum  
therefrom onto the gumming extension of the  
feed-roller for the purpose set forth, a device  
5 for restraining the intermediate portion of  
the blank on the first-named support, and  
means for overturning opposite side portions  
of the blank, whereby one portion becomes  
marginally superimposed on the other over-  
10 turned portion.

42. In a paper-box machine, the combina-  
tion with a support onto which flat blanks  
may be fed, of a support for a pile of blanks,  
a mechanism for pushing the lowermost blank  
15 of the pile toward the first-named support, a  
pair of feed-rolls to the action of which the

blank is pushed, one said roll having an end-  
wise-located gumming extension 42, and a  
groove 43 between it and the roll proper, the  
gum-box 44 and a roll 45, as and for the pur- 20  
pose set forth, a device for restraining the in-  
termediate portion of the blank on the first-  
named support, and means for overturning  
opposite side portions of the blank whereby  
one portion becomes marginally superimposed 25  
on the other overturned portion.

Signed by me at Springfield, Massachusetts,  
in presence of two subscribing witnesses.

CHAUNCEY W. GAY.

Witnesses:

WM. S. BELLOWS,  
A. V. LEAHY.