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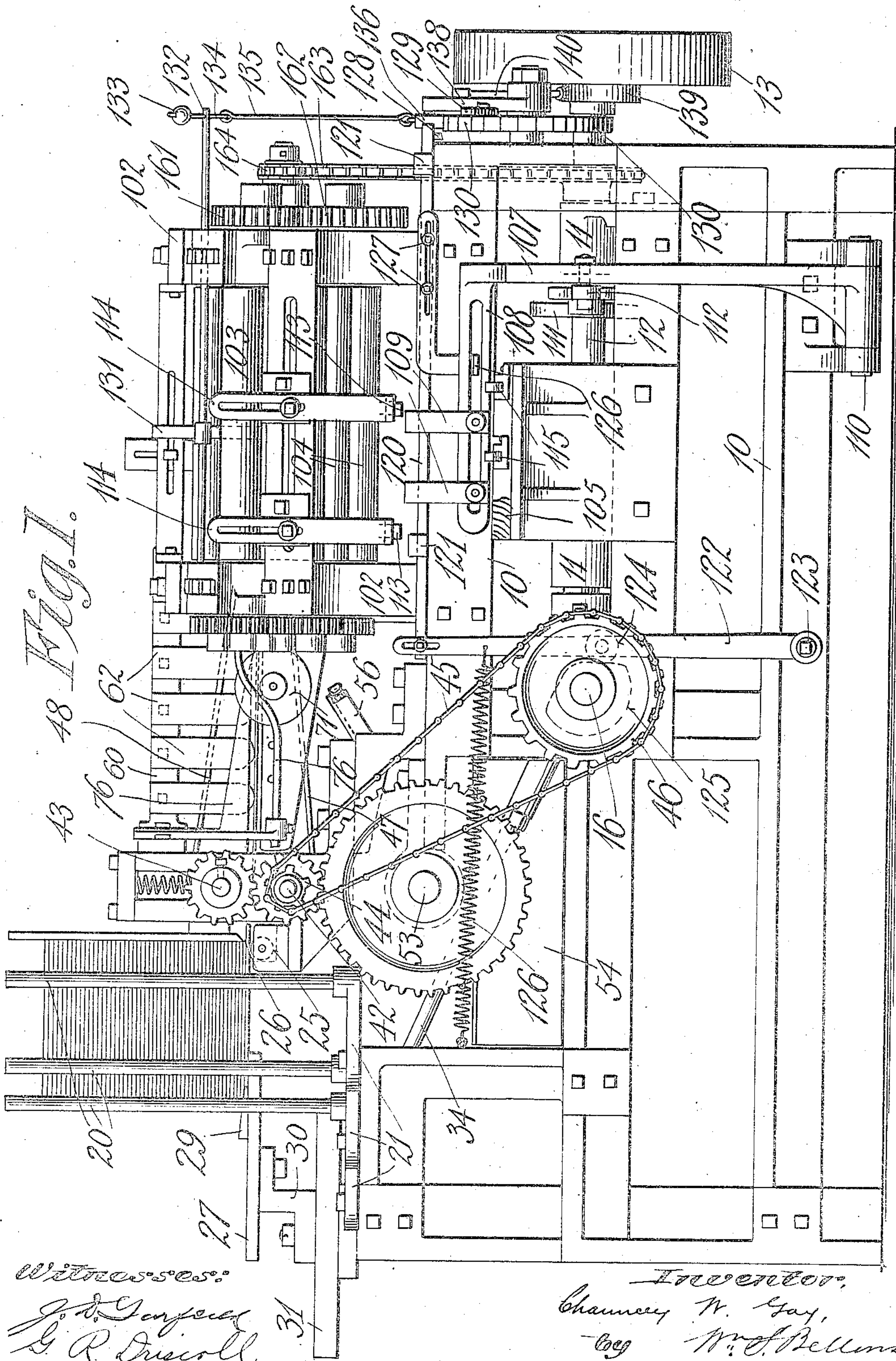
C. W. GAY.

PATENTED MAR. 10, 1908.

PAPER BOX MACHINE.

APPLICATION FILED SEPT. 14, 1904.

7 SHEETS—SHEET 1.



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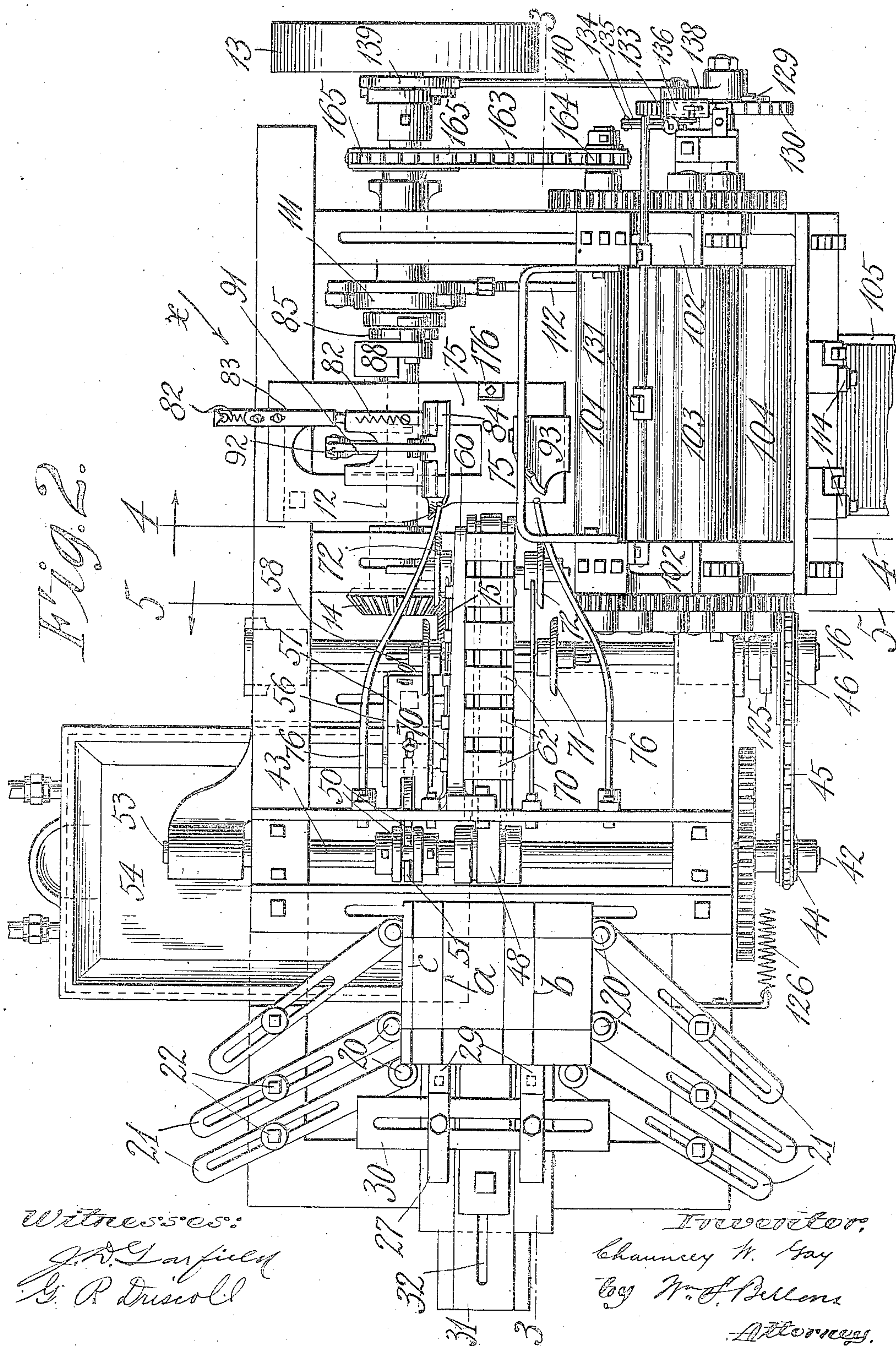
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7 SHEETS—SHEET 2.



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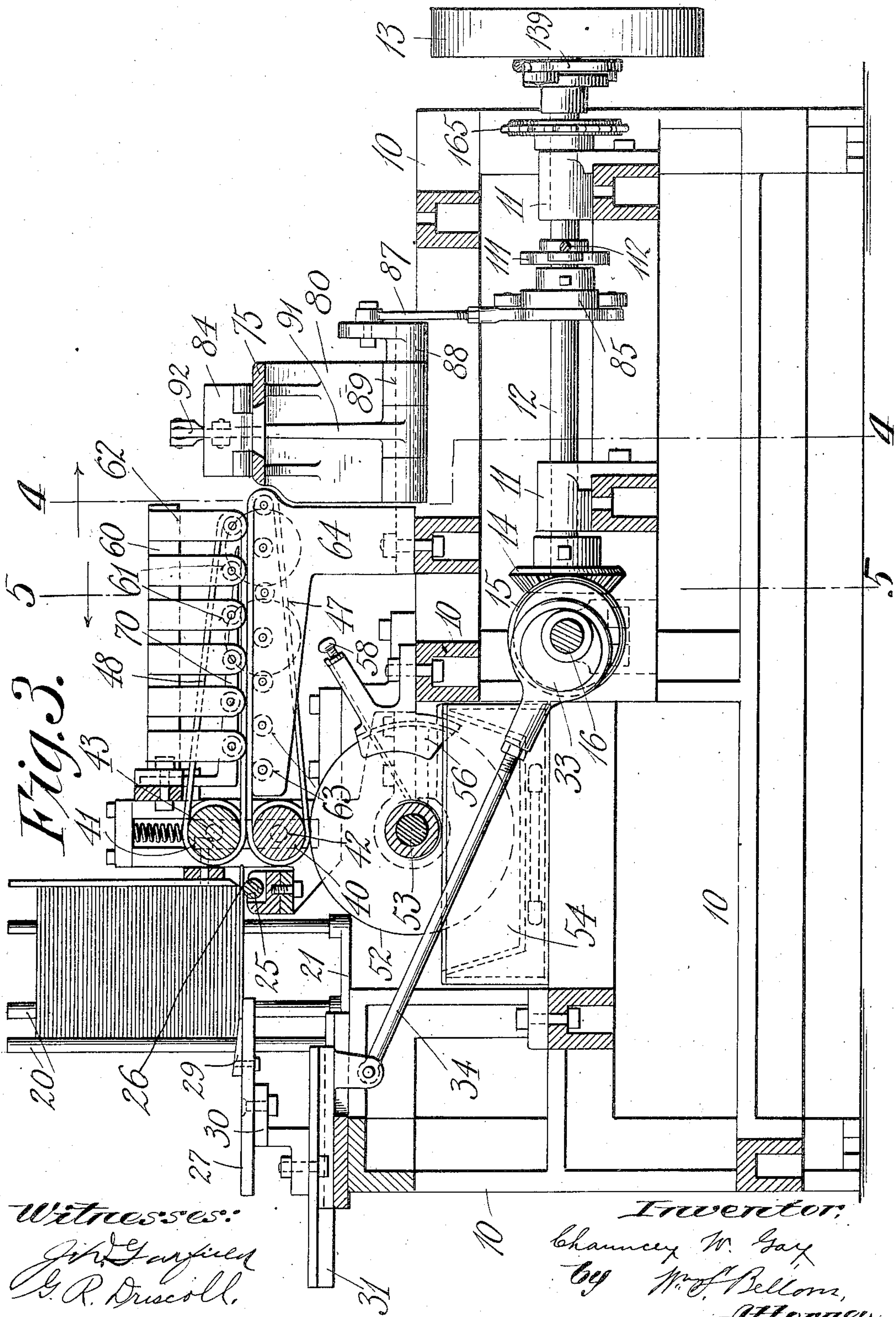
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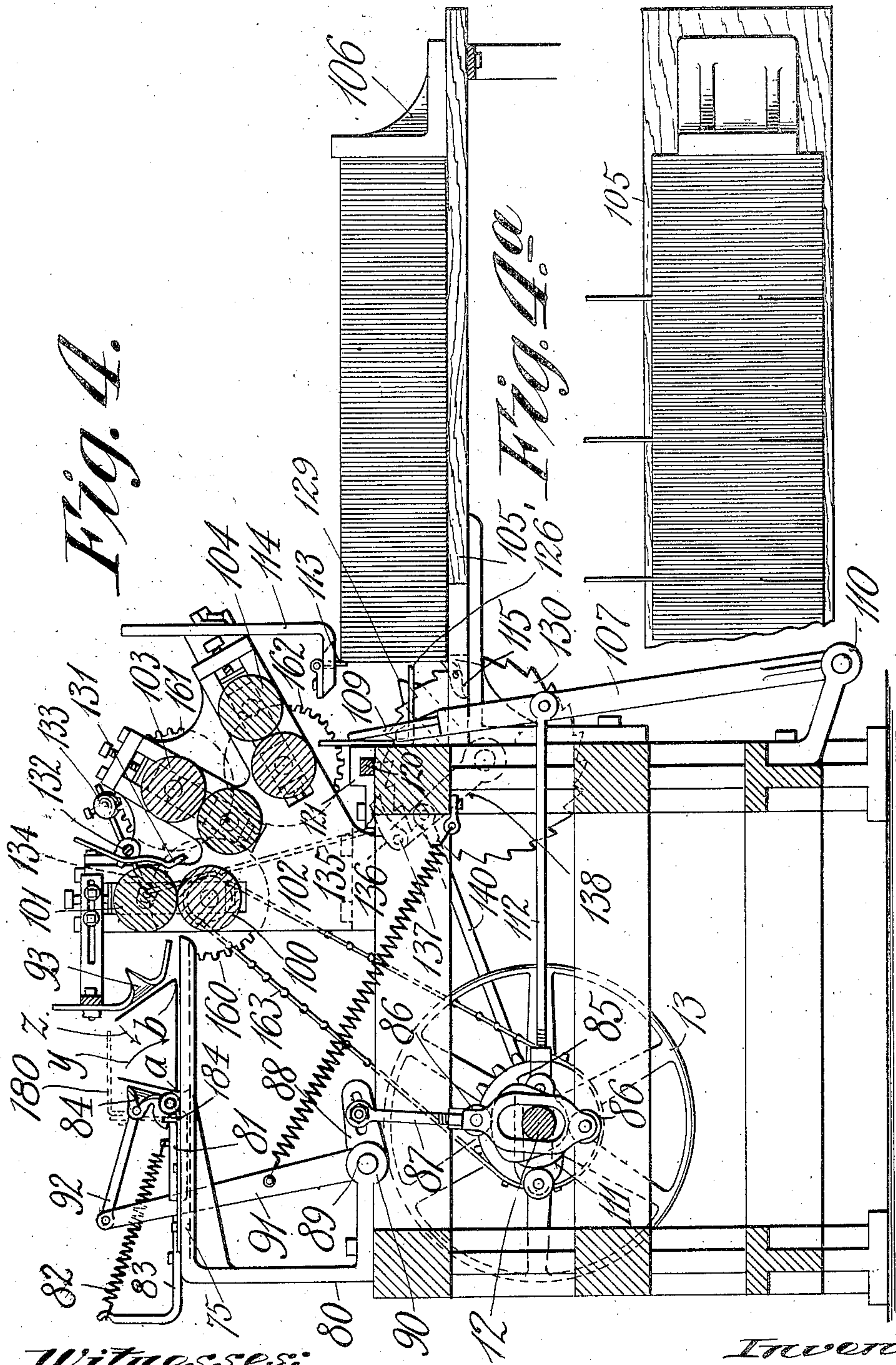
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7 SHEETS—SHEET 4



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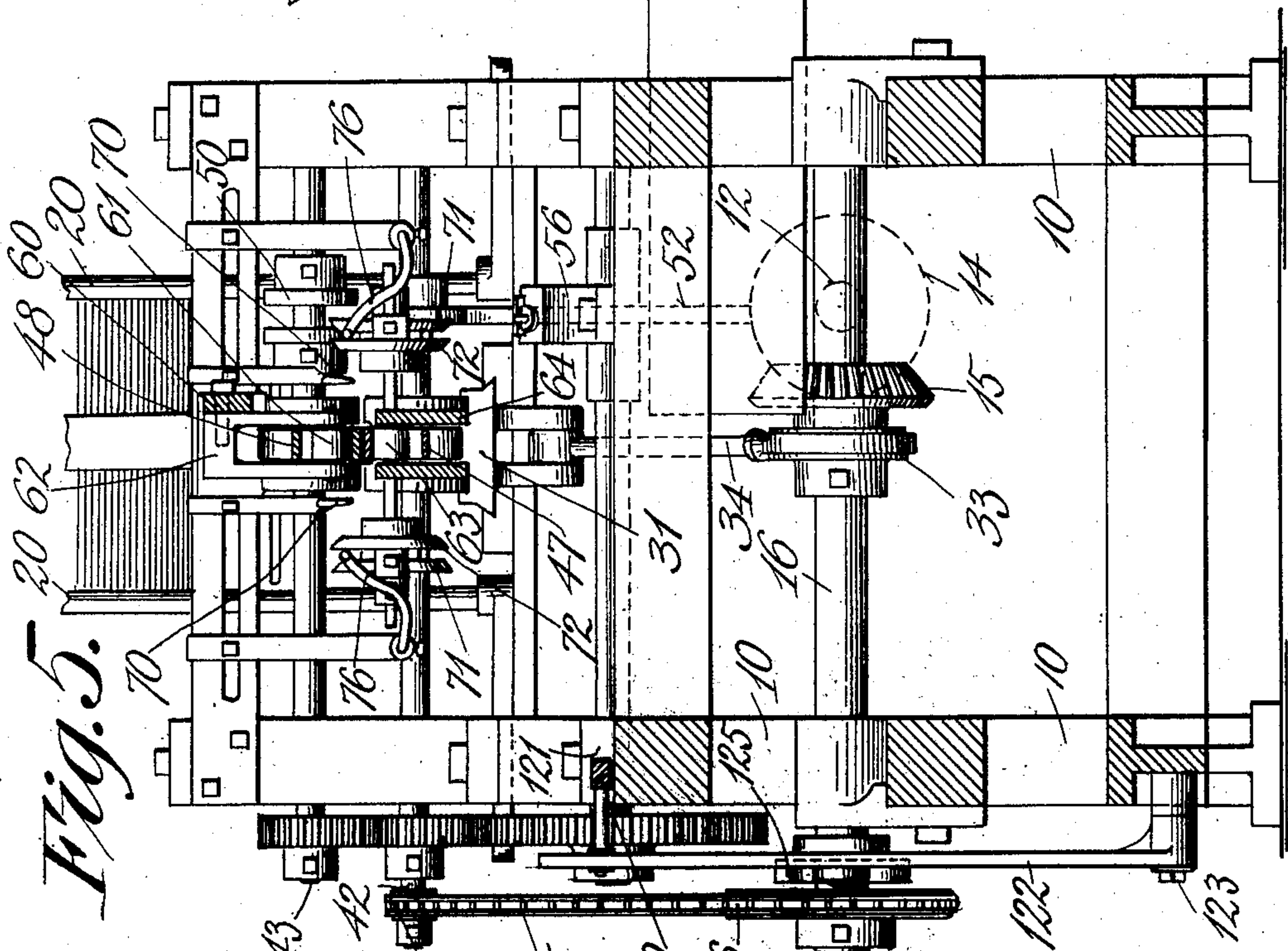
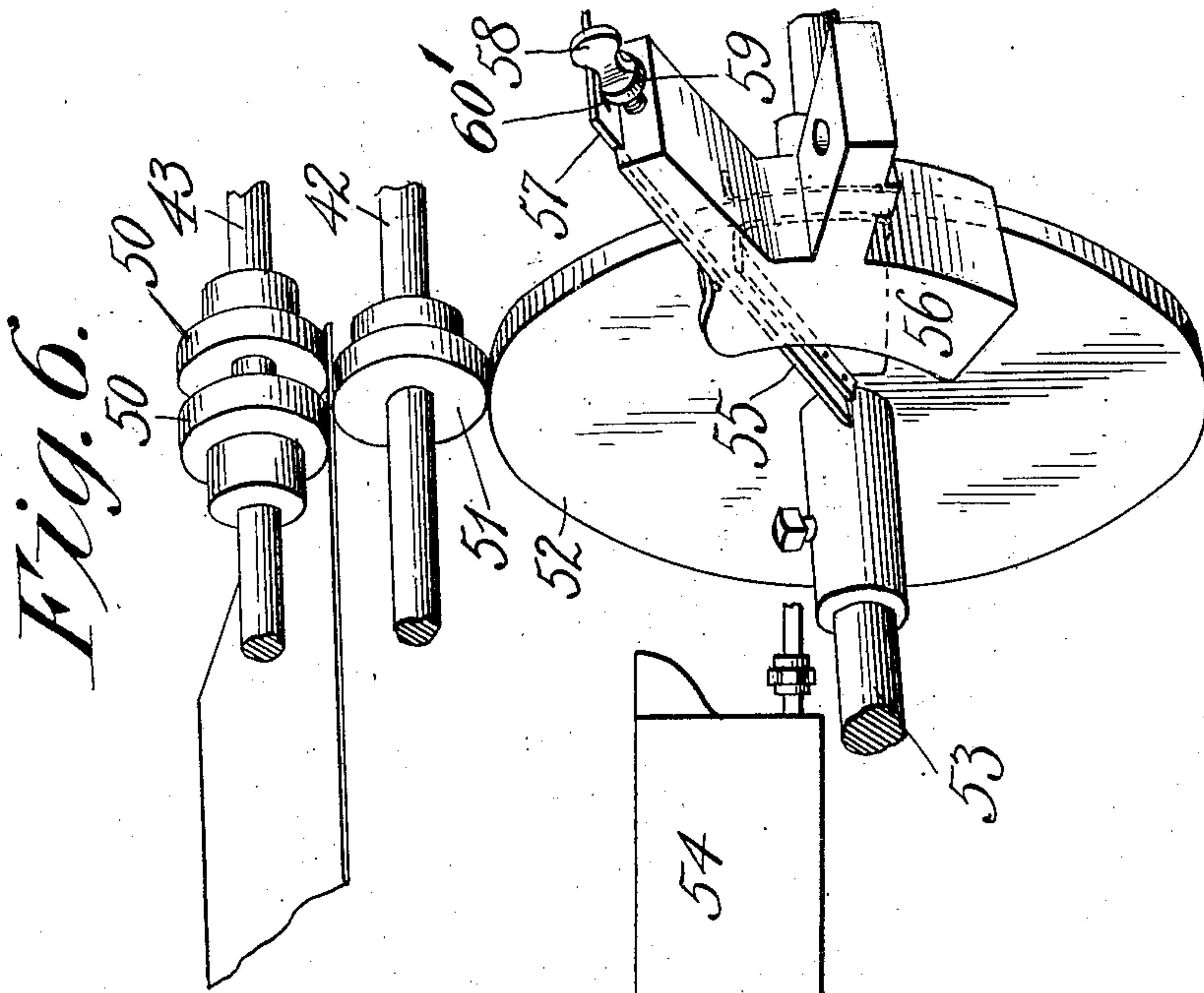
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7 SHEETS—SHEET 5.



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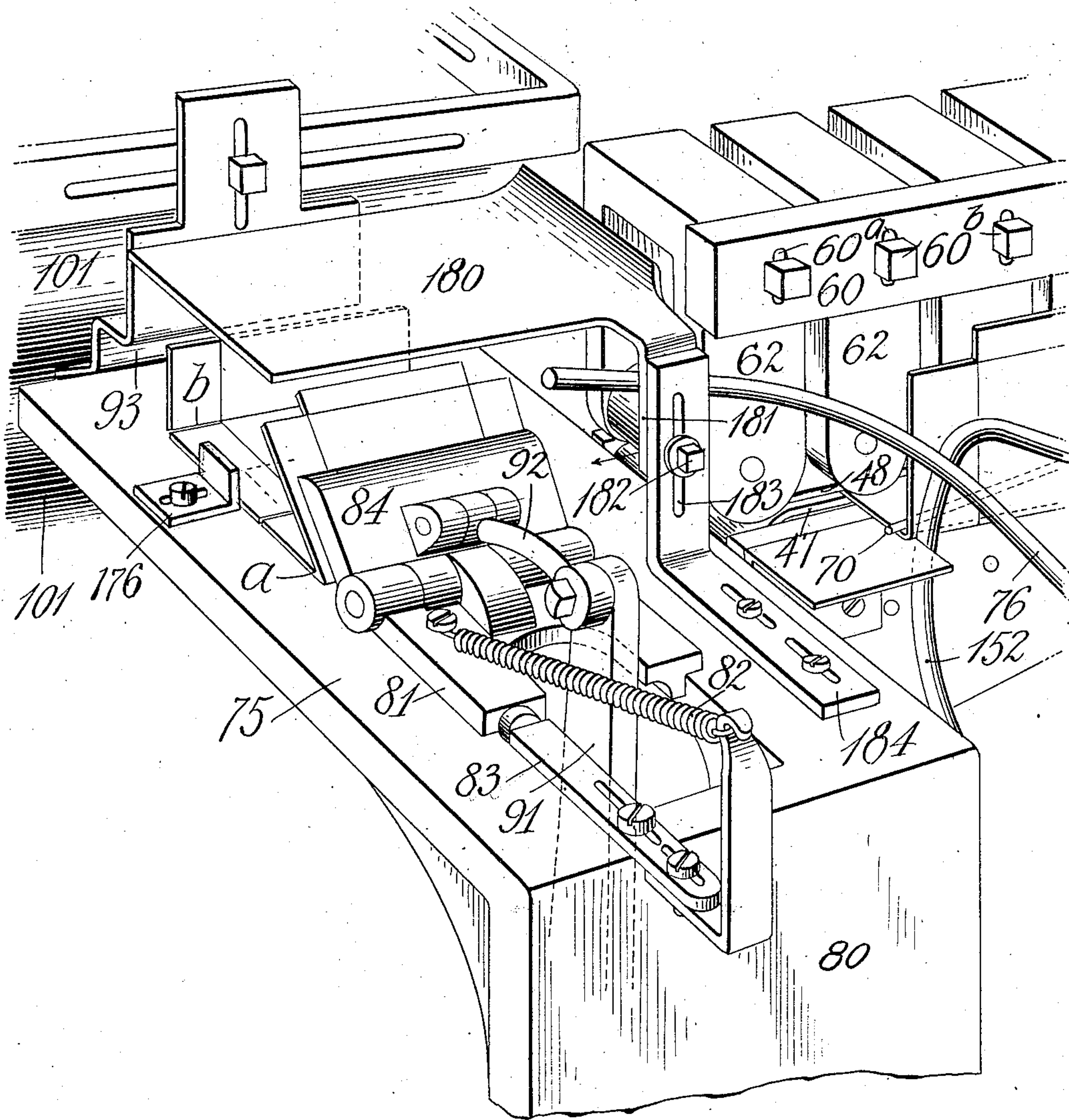
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7 SHEETS—SHEET 6.

Fig. 7.



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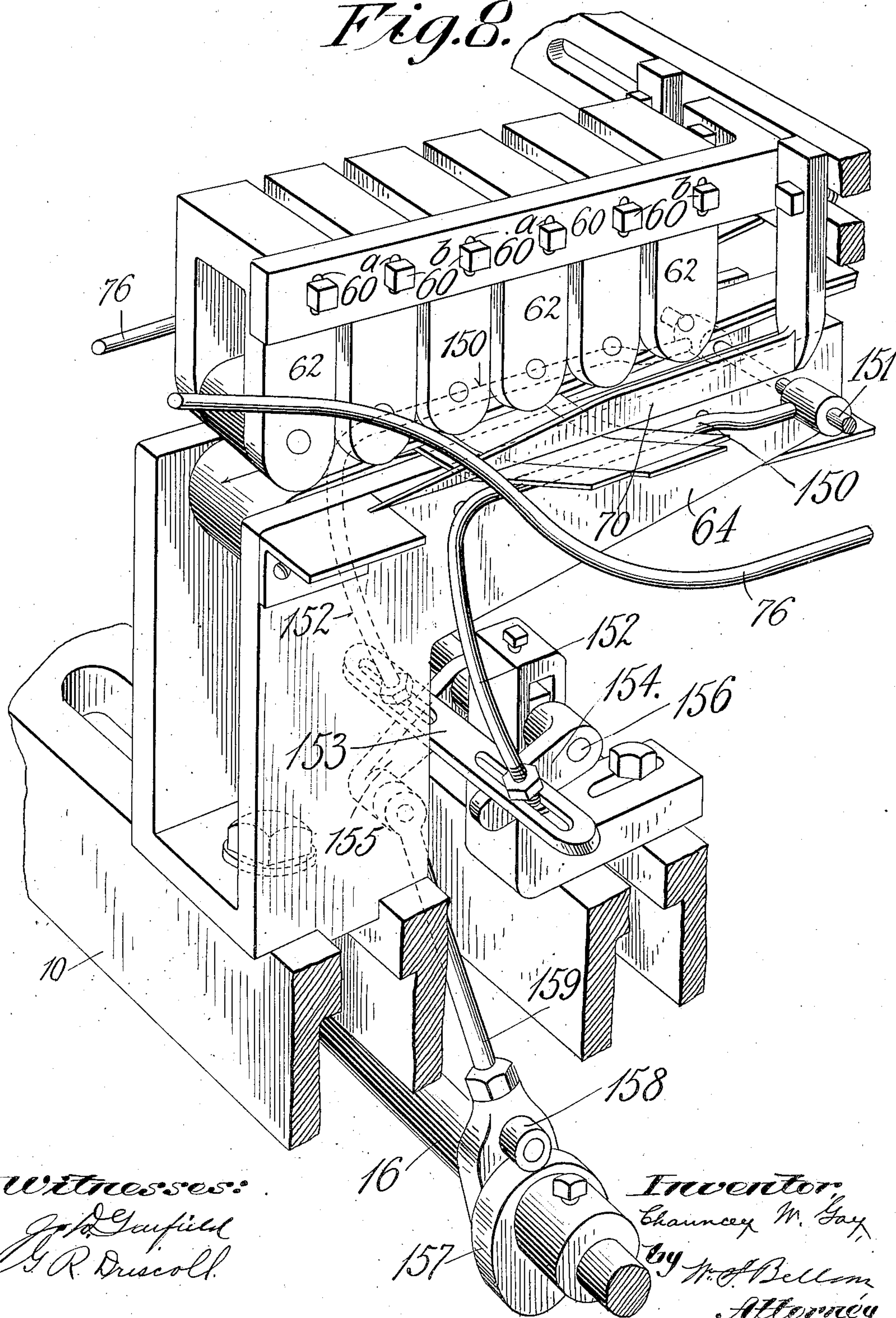
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7 SHEETS—SHEET 7.

Fig. 8.



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UNITED STATES PATENT OFFICE.

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PAPER-BOX MACHINE.

No. 881,118.

Specification of Letters Patent.

Patented March 10, 1908.

Application filed September 14, 1904. Serial No. 224,441.

To all whom it may concern:

Be it known that I, CHAUNCEY W. GAY, a citizen of the United States of America, and 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 machines for folding blanks of cardboard, after the same have been properly scored, said blanks being supplied with a deposit of gum for holding the opposite sides of the blank together and thus forming cartons which may be col-
15 lapsed and stacked into piles ready for shipment, and my invention has for one of its objects the provision of an improved machine, in which the blanks to be folded are placed in a pile at one end thereof, and are subjected one by one to a gumming mechanism of improved construction.

My invention has, furthermore, for its object the provision of improved blank-carry-
25 ing or transferring mechanism coöperative with flap-bending devices whereby the flaps are left in such a position relative to the body of the blank as to be readily operated upon by the folders.

30 My invention has, furthermore, for its object improved folding and compressing means, whereby the blanks are formed into collapsed cartons.

A further object of my invention resides
35 in the provision of an improved carton-receiving table and in the combination therewith, of a counting device for leaving a carton projecting beyond the pile after a certain number shall have been deposited on the
40 table.

My invention also includes as one of its features a series of feeding and flattening rollers so organized that the successive cartons will be transferred from a substantially
45 level position into a vertical position on the receiving table, thereby obviating the necessity of piling the cartons one on top of the other, vertically, and consequently rendering the removal of the folded cartons an easy
50 matter.

Further objects of the invention will be found in the particular construction and organization of some of the coöperating elements, as will be hereinafter described and
55 pointed out in the claims.

In the accompanying drawings in which

similar characters denote similar parts,—
Figure 1, represents a side view of a machine embodying my invention. Fig. 2, is a top
view thereof. Fig. 3, shows a central longi- 60
tudinal section, on line 3, 3, of Fig. 2. Fig. 4, is a vertical transverse section on line 4, 4,
of Fig. 2. Fig. 4^a represents a partial top
view of the carton-receiving table and the
folded blanks counted off. Fig. 5, is a verti- 65
cal transverse section line 5, 5, Fig. 2. Fig. 6, illustrates in perspective view the gum-
ming device. Fig. 7, is a perspective view
looking in the direction of arrow *x*, Fig. 2.
Fig. 8, is a similar view showing a modifica- 70
tion of the flap-bending devices.

Briefly stated, my improved machine has at one end a pile of blanks, which are fed into the machine one by one, from the bot-
tom of the pile. The blank is then carried 75
by a conveyer, past a gumming device whereby a marginal line of gum is applied to the edge of one of the blank flaps. Dur-
ing its advance movement, the blank is brought into contact with flap bending de- 80
vices which turn the flaps upward while the body of the blank remains flat, and is then carried into the path of a laterally-movable
folder which first folds the gummed flap
down against the body, and subsequently 85
moves the now partly-folded blank to a flattening mechanism which becomes effective in folding the other flap down upon the
gummed flap and finally presses the flaps
tightly together. The blank which thus far 90
has been maintained in a level position, is now carried by a series of squeezing rollers to the carton-receiving table, upon which it
will fall with one edge down, and body por-
tion vertical, in which condition the succes- 95
sive blanks are pushed sidewise, until a certain number have been thus operated
upon, when this operation is interrupted and
one blank is left undisturbed, therefore
leaving the same projecting beyond the car- 100
tons stacked on the table.

In the drawings, 10 denotes a suitable frame, supporting in the bearings 11, a driv-
ing shaft 12, carrying the pulley 13, to which
movement may be imparted from any con- 105
venient source. Also mounted on this shaft is a bevel gear 14 meshing with a similar
gear 15 secured upon a transverse shaft 16,
from which the blank feeding mechanism is
operated. 110

In order to arrive at a clear understanding of my improved machine, I will describe the

several parts substantially in the succession in which they operate upon the blanks, a number of which are piled up near the left end of the machine, (see Figs. 1 and 2,) and which are fed one at a time from the bottom of the pile. It is, of course, presupposed that the blanks are properly cut and scored, for instance, as is clearly shown in Fig. 2, these blanks to be folded on longitudinal score lines *a b*, after the marginal lines of gum, or other adhesive substance, has been deposited on the under side of the flap *c*. The blanks are contained in a magazine formed by adjustable guiding posts 20, having slotted bases 21, which may be secured upon the frame of the machine by clamp bolts 22.

The forward edges of the pile of blanks are supported on a roller 25, and the small outlet opening 26 will permit only the bottom blank to be removed from the pile. The rear edges of the blanks rest upon plates 27, having blank engaging blocks 29 secured upon a slide plate or yoke 30, which is held on a slide 31, slotted at 32, to permit the yoke 30 to be adjusted thereon as required.

Reciprocatory movement is imparted to the slide 31 from an eccentric 33, mounted upon the shaft 16 and connected with the slide 31 through a connecting rod 34. As the slide 31 is moved forward by the mechanism just described the blank is carried forward between a pair of superposed rolls 40 and 41 mounted on shafts 42, 43, respectively, which are journaled in spring pressed boxes carried by the frame 10, the lower shaft 42 being constantly driven by a sprocket 44 secured thereto, and a chain 45, actuated by a sprocket 46, which is mounted upon the shaft 16 above referred to.

The roller 40 constitutes a pulley for an endless belt 47, which in connection with a belt 48, passing over the roller 41, forms a blank-receiving and transferring device to carry the blank past and subject to the action of the flap-bending device as will hereinafter appear.

Mounted upon the upper shaft 43, are a pair of rollers 50 having a space between them and coöperative with a gum deposit roller 51, which is mounted upon the lower shaft 42, and receives a supply of gum by peripheral surface contact with a disk 52. This disk is mounted upon a shaft 53, which is journaled in bearings provided therefor on a gum box 54, which may be of any suitable construction.

Practice has demonstrated that the sides of the disk 52 are apt to carry an over-abundance of gum, and throw the same about promiscuously, and for that reason means are shown whereby the sides of the disk will be relieved of the gum, leaving only the peripheral face of the disk supplied therewith, and such means include a pair of scrapers 55, the lower

edges of which are in contact with the sides of the disk, and which are supported on a bracket 56 secured upon the frame 10 in any desired manner; and, in order to prevent too great a quantity of gum to be deposited upon the lower surface of the blank flap *c*, I have provided a doctor blade 57, held for sliding motion in the bracket 56, and capable of being adjusted relatively to the periphery of the disk 52, as, for instance, by a screw 58 having an annular flange 59 entering a slot 60' in the doctor blade, the screw 58 being in screw-threaded engagement with the bracket 56 as clearly shown in Fig. 6.

The space between the rollers 50 above referred to is substantially equal to the thickness of the roller 51 and for this reason it will be evident that, as the blank is carried between the rollers 50 and 51, the gum which is deposited upon the under side of the blank flap, will not be spread or squeezed out laterally of the line which is to be gummed, so that the deposit of gum will always be confined to a certain predetermined width.

Rigid longitudinally-extending bars 60 are provided to support a plurality of belt backing rollers 61, journaled in the brackets 62, which may be adjusted on the bar longitudinally as well as vertically, to coöperate with a series of rollers 63, which are journaled in a bracket 64 secured upon the frame 10, and constituting supporting devices for the belt conveyer 47 above mentioned.

By referring to Fig. 3, it will be seen that the rollers 61 and 63 are staggered, so that when the rollers 61 are properly adjusted vertically they may cause the adjacent runs of the belts 48 and 47 to follow a sinuous path, and that, therefore, the belts need not necessarily be very tight to cause sufficient friction for carrying the blank. The aforementioned adjustment of the series of rollers 63, may be accomplished by bodily and individually vertically moving the brackets 62 for such rollers 63, as may be done by providing vertical slots 60^a through the supporting bar 60 for the brackets, and through which slots the bolts 60^b are passed with a screw thread engagement into the wide upper portions of the brackets. These belts transfer the blank beneath a pair of swords 70, which are disposed substantially in alignment with the score lines *a b*, and serve to hold the body of the blank at those lines while the flaps are being turned or bent upward. This bending operation takes place gradually, and is effected in a preparatory manner by as an example a pair of bending disks 71, having their peripheries projecting above the plane of the blank, and therefore causing the flaps to be slightly bent upwards as the blank passes above them. Another pair of bending disks 72, the distance between which is less than that between the disks 71, is provided a short dis-

tance beyond the previous set of disks, so that the flaps will be still more bent upward until they arrive substantially in a vertical position relative to the body portion of the blank, which now appears folded into a U form. Each blank, as it is carried forward by the conveyer belts 47 and 48, is projected upon a table 75 upon which it comes to rest against a stop 176, the flaps of the blank being held in a vertical folded position by guards 76, rigidly secured to the frame of the machine. The next operation on the blank will be that of folding the gum flap downward against the body portion of the blank, this operation being effected by a folding mechanism which is clearly shown in Figs. 4 and 7 of the drawings. Secured to the frame 10 is a bracket 80, the upper end of which is disposed horizontally to form the table 75 above mentioned, and mounted for sliding movement on this table is a slide 81, which may be normally pulled rearward by a spring 82, such rearward movement being limited by a stop 83 which is adjustable as shown, and fixed on the table 75. (See Fig. 7.) Pivoted near the forward end of the slide 81 is a folding blade 84 having a limited opening movement on said slide, and operable in both directions by a cam 85, mounted upon a shaft 12 acting on rollers 86 which are journaled on a rod 87, the free end of which is attached to an arm 88 mounted upon a shaft 89 which is journaled in a bearing 90 constituting a part of the bracket 80. Also secured to the shaft 89 is a lever 91, the upper end of which is connected through the intervention of a link 92, with the folding blade 84 above mentioned, and the angular movement of which may be varied by properly adjusting the point of connection between the rod 87 and arm 88, as will be readily understood.

In Fig. 4, the folding blade 84 is shown in its retracted position, and about to engage and fold downward to the blank flap around the score line *a*, which, as has been previously stated, has a marginal line of gum on what was formerly its under side but which is overturned to become its upper side, and which, in the present position, is that next the folding blade 84. As the shaft 12 is rotated, the lever 91 will be moved to cause the folding blade 84 to fold the blank flap downward as indicated by the arrow *y*, Fig. 4, and as soon as the folding blade has arrived in its downward position, the slide 81 will be moved bodily forward horizontally on the table 75 causing the other flap of the blank to be folded on top of the previous flap, such blank swinging as indicated by arrow *z*, this action being directly effected by the impingement of the flap against a stationary folding blade 93 adjustably secured in any convenient manner to the frame. It will be appreciated that the

folding blade or wing 84 has compound movements as follows:—it first swings downwardly to the horizontal position to fold down the flap *a* of the blank, (during which downswinging of the blade the slide on which the blade is pivoted remains immovable, being restrained by the spring 82) and then the movement of the lever 91 continuing after the blade has been swung to the horizontal position, the blade and slide are, through the link 92 connecting the blade and lever 91,—moved horizontally together, the forward edge of the slide by its engagement with the folded edge of the blank forcing the partially folded blank under the stationary folder blade 93. The blank, the flaps of which have been folded in the manner described, will then be subjected to the action of a pair of cooperative pressing rolls 100 and 101, the former, 100, of which is journaled in the stationary bearings held in a pair of auxiliary frames 102, while the latter, 101, are mounted in spring-pressed bearings of suitable construction. As previously stated, the blanks are,—after being folded,—deposited upon a carton-receiving table with one of their edges resting thereon, and means are provided for diverting the thus far horizontal path of the blank into a vertical one, these means consisting substantially of a set of compressing rolls designated in a general way by 103 and 104 respectively, and being similar in construction to the rolls 100 and 101 above described, and also serving as additional devices for insuring a perfect contact between the flap portions to be united by the deposit of gum.

The several sets of rolls, 100, 101, 103, and 104 are preferably geared together in the manner shown in Fig. 4, in which a gear 160 on the lower roll 101, is illustrated in engagement with a gear 161 for driving the upper roll 103, while another gear 162 drives the lower roll 104, thus preserving the uniform direction of rotary movement for the purpose of advancing the blank in the required manner. The initial driving movement is imparted to the lower roll 100 by a chain 163, which drives a sprocket 164 mounted on the shaft of the lower roll 100, and is driven from a sprocket 165 mounted upon a main shaft 12. As the folded blank leaves the last set of pressing rolls 104, it will be dropped vertically onto a carton-receiving table 105, having a sliding weight 106, longitudinally movable thereon and adapted to be gradually forced rearward by the accumulating cartons on the table. Each blank, as it drops onto the table, will pass and come to rest in front of a pusher 107, (see Figs. 1 and 4) comprising a horizontally-disposed arm 108 which may be slotted to receive, in suitably adjusted positions thereon, one or more pusher blades 109. The pusher lever 107 is preferably pivoted on a bracket 110 secured

to the frame and an oscillatory motion is imparted to it by a cam 111 secured upon a shaft 12, and actuating a rod 112, as seen in Fig. 4. The reciprocation of this lever results in the forcing of successive blanks beneath and past a detent 113, pivoted on an angle bracket 114 secured to the side frame 102, and also above and beyond a pair of gravitative detents or by-passes 115 pivoted in the table 105, these by-passes serving to retain the blanks in their pushed-forward position, and, therefore, avoiding interference with the subsequently following folded cartons as they are discharged from the rolls 104.

In conjunction with the delivery portion of the machine, last described, a counting mechanism is employed whereby one blank will be left projecting beyond the others after a certain number thereof have been deposited on the table. This counting mechanism is clearly shown in Figs. 1 and 4, in which it will be seen that a bar 120 is guided by blocks 121 secured to the frame in a suitable manner, and reciprocatory movement is imparted to it by a lever 122, fulcrumed at 123 to the frame, and having a roller 124 in engagement with a cam 125 on shaft 16 whereby said lever 122 is pushed toward the right as seen in Fig. 1, while a spring 126 may be employed for moving the bar 120 toward the left. This bar constitutes the medium whereby the successive blanks, as they drop upon a table 105 will be pushed from right to left, the particular device for accomplishing this purpose being shown herein as a finger 126', adjustably secured on the bar 120, as, for instance, by screws 127. The right hand end of the bar 120 has a pin 128 adapted to be engaged by a stop plate 129, which is secured upon a disk 130 made in the form of a ratchet to which a step by step movement may be imparted by the mechanism to be hereinafter described. In the present instance I have shown the ratchet wheel as having 25 teeth, and during the advance of 24 of such teeth, the bar 120 may reciprocate with perfect freedom and without meeting any obstruction. At the 25th tooth, however, the plate 129 will project into the path of the pin 128 during its movement from right to left, as seen in Fig. 1, so that consequently the spring 126 will not have any efficiency in moving said bar. From this it follows that the finger 126' will become inoperative, and leave the blank in its original position, which it took when dropped on the table, namely, projecting beyond the other cartons which had been previously pushed aside by said finger 126'.

Inasmuch as it is essential under the present circumstances that the counting of the cartons shall take place accurately, or, in other words, that the counting device shall operate only as blanks are passing through

the machine, means are provided for normally retaining the ratchet wheel 130 inactive, motion being imparted thereto only as a blank is actually passing through the machine. The mechanism employed for achieving this result is clearly shown in Fig. 4, in which what may be termed a "feeler" 131 is disposed directly in the rear of the rolls 100 and 101. This feeler 131 is mounted upon a spindle 132 pivotally supported on a frame and having a counterweight 133 for normally throwing the lower end of the feeler 131 toward the rolls 101, as seen in Fig. 4. The spindle 132 is also provided with an arm 134, which is connected through a link 135 with a pawl 136 pivoted at 137 on an arm 138, the pivot axis of which is concentric with that of the ratchet 130, and which may be operated from an eccentric 139 (see Fig. 1) mounted upon the shaft 12, and connected with said arm by a rod 140 of usual construction.

The description just given clearly shows that a constant oscillatory movement will be imparted to the arm 138, while, however, the ratchet wheel 130 will not be operated unless pawl 136 has been lowered into position by a blank striking the feeler 131, so that a movement of the ratchet wheel 130 can only result when the blank is passing between rolls 100 and 101.

In Fig. 8 I have shown flap bending means which may be employed in substitution of the rollers 71 and 72, the present construction including a pair of benders 150 mounted with their rear ends upon a spindle 151, which may be suitably journaled horizontally and transversely in the frame 64. The active bending portions of the lever-like benders 150 are substantially horizontal and terminate in downwardly extended ends 152, which may be secured to a cross bar 153 in the manner shown in Fig. 8. A rising and falling movement is imparted to the bar 153 by a pair of arms 154 and 155, mounted upon a stud 156, which may be journaled in a suitable bearing held on a frame. The lever-like benders, are swung in parallel vertical planes by a cam 157, mounted upon shaft 16 and engaging a roller on a thrust rod 159, which is connected with the aforementioned arms 155. The lever-like benders, mechanically and positively operated and having rising and falling motions in parallelism, and along side of and normally under, the carrying belts, are preferred appliances for embodiment in the machine here covered.

The machine as described is capable of very rapid operation, and therefore it is necessary that the blanks as they are deposited on the folding table, shall be quickly and accurately positioned relatively to the folding mechanism.

The transfer belts or conveyers 47, 48 are operated at a high rate of speed, and project

the blank against the stop 76, and inasmuch as practice has demonstrated that the blanks are apt to jump upwards after leaving the conveyers, means are provided whereby the blank is not only prevented from leaving the table, but whereby, furthermore, its movement will be frictionally affected. These means consist substantially of a guard plate 180, (see Fig. 7) disposed at a sufficient height from the folding table 75 to avoid interference with the upturned flaps of the blank, but yet will prevent the blank from jumping, and at the same time constituting a stationary surface on which the flap edges may travel and thus retard the movement of the blank.

Since the guard plate is comparatively large and for that reason covers many parts of the machine which it is especially desired to illustrate, the plate 180 has been omitted from the general views, and its form and application has been clearly shown in Fig. 7, particularly drawn for that purpose. Here the plate is shown provided with a downwardly projecting ear 181, carrying a clamp bolt 182 which may be adjusted in a slot 183 of an angle bracket 184, secured to the folding table 75 in any suitable manner.

The counting mechanism made with reference to, and comprising, the set of outfeeding pressure rolls, having approximately a quadrantal arrangement, preferably, and as represented in Fig. 4,—whereby the blanks or other products of the machine are carried from a horizontal position to a vertical position and down to the level of the final receiving support,—the reciprocatory slide for pushing the blanks individually across said support, the rotatable ratcheted disk having a stop plate, a successively vibrating pawl cooperating with the ratcheted disk and normally out of engagement therewith, and a feeler provided to the pawl, and subject to affect by the passage of blanks in a curved course through said rolls, is a device susceptible of inclusion in, and as a part of, other machines for paper manufactures such, for instance, as envelop machines and printing machines, and is included in the subject matter of a separate application for Letters Patent of the United States, filed by me November 3, 1904, No. 231,294.

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 mechanism for feeding successive blanks, and a gumming device for depositing a supply of gum on one of the blank flaps; of means for angularly bending a side portion of each blank, of a folding mechanism comprising a table, onto which the angularly bent blanks are fed by the feeding means, a slide horizontally movable on said table transversely of the line of feed of the blanks

thereto, a folding blade pivoted to the edge of the slide, bodily movable in unison with the slide and also having a swinging movement relatively thereto, and a means operative both to swing said blade relatively to the slide, and to subsequently move said slide and the blade together.

2. In a paper box machine, the combination, with mechanism for feeding successive blanks, and a gumming device for depositing a supply of gum on one of the blank flaps of means for angularly bending a side portion of each blank, of a folding mechanism comprising a table, onto which the angularly bent blanks are fed by the feeding means, a slide horizontally movable on said table transversely of the line of feed of the blanks thereto, a folding blade pivoted to the edge of the slide, bodily movable in unison with the slide and also having a swinging movement relatively thereto, and a cam-operated swinging lever linked to the folding blade, and operative to swing the blade relatively to the slide and to also move the swung blade and slide together horizontally on the table.

3. In a paper box machine, the combination, with mechanism for feeding successive blanks, and a gumming device for depositing a supply of gum on one of the blank flaps; of a folding mechanism comprising a swinging flap folder for folding the gummed flap, and means for operating said swinging flap folder, a stationary blade for folding the second flap over the gummed flap, and means for moving the partially folded blank relatively to the stationary blade, whereby such blade causes the second flap to be folded onto the gummed flap.

4. In a paper box machine, the combination, with mechanism for feeding successive blanks, and a gumming device for depositing a supply of gum on one of the blank flaps; of a folding mechanism located to one side of the line of feed of the blanks comprising a slide movable transversely of the line of feed of the blank to the folding mechanism, a folding blade pivoted thereon, and means for actuating said blade and subsequently moving said slide and the blade together, and a stationary blade opposite the pivoted folding blade and to the other side of the line of blank feed, for folding the second flap over onto the gummed flap during the movement of said slide and in relation to which the partially folded blank is transversely moved by said slide.

5. In a paper box machine, the combination, with mechanism for feeding successive blanks, a gumming device for depositing a supply of gum on one of the blank flaps, and means for bending the flaps of the blank to form an angle with the body portion of the blank; of devices for overturning the flaps onto the body of the blank, a carton-receiving table, and a plurality of pairs of suc-

cessively - operative feeding and flattening rollers, having quadrantal arrangements, for diverting the horizontal longitudinal path of the blank into a vertical one, and for depositing the folded blank upon the receiving table.

6. In a paper box machine, the combination, with mechanism for feeding successive blanks, a gumming device for depositing a supply of gum on one of the blank flaps, and means for bending the flaps of the blank to form an angle with the body portion of the blank; of devices for overturning the flaps onto the body of the blank, a carton-receiving table, and a plurality of pairs of successively-operative feeding and flattening rollers, having quadrantal arrangements, for diverting the horizontal longitudinal path of the blank into a vertical one, and for depositing the folded blank upon the receiving table, and means for retaining the blanks in vertical position thereon.

7. In a paper box machine, the combination, with mechanism for feeding successive blanks, a gumming device for depositing a supply of gum on one of the blank flaps, and means for bending the flaps of the blank to form an angle with the body portion of the blank; of devices for overturning the flaps onto the body of the blank, a carton-receiving table, and a plurality of pairs of suc-

cessively - operative feeding and flattening rollers, having quadrantal arrangements, for diverting the longitudinal path of the blank into a vertical one, and for depositing the folded blank upon the receiving table, and a pair of devices for engaging and holding the blank against return movement on the table.

8. In a paper box machine, the combination, with mechanism for feeding successive blanks, a gumming device for depositing a supply of gum on one of the blank flaps, and means for bending the flaps of the blank to form an angle with the body portion of the blank; of devices for flattening the blank, a carton-receiving table, and a plurality of pairs of successively-operative folding and flattening rollers, having quadrantal arrangements for diverting the longitudinal path of the blank into a vertical one, and for depositing the folded blank upon the receiving table, and a pair of by-passes for engaging the upper and lower edges of the blank, respectively, and a device for moving the blank beyond said by-passes.

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

CHAUNCEY W. GAY.

Witnesses:

WM. S. BELLOWS,
G. R. DRISCOLL.