

No. 645,950.

Patented Mar. 27, 1900.

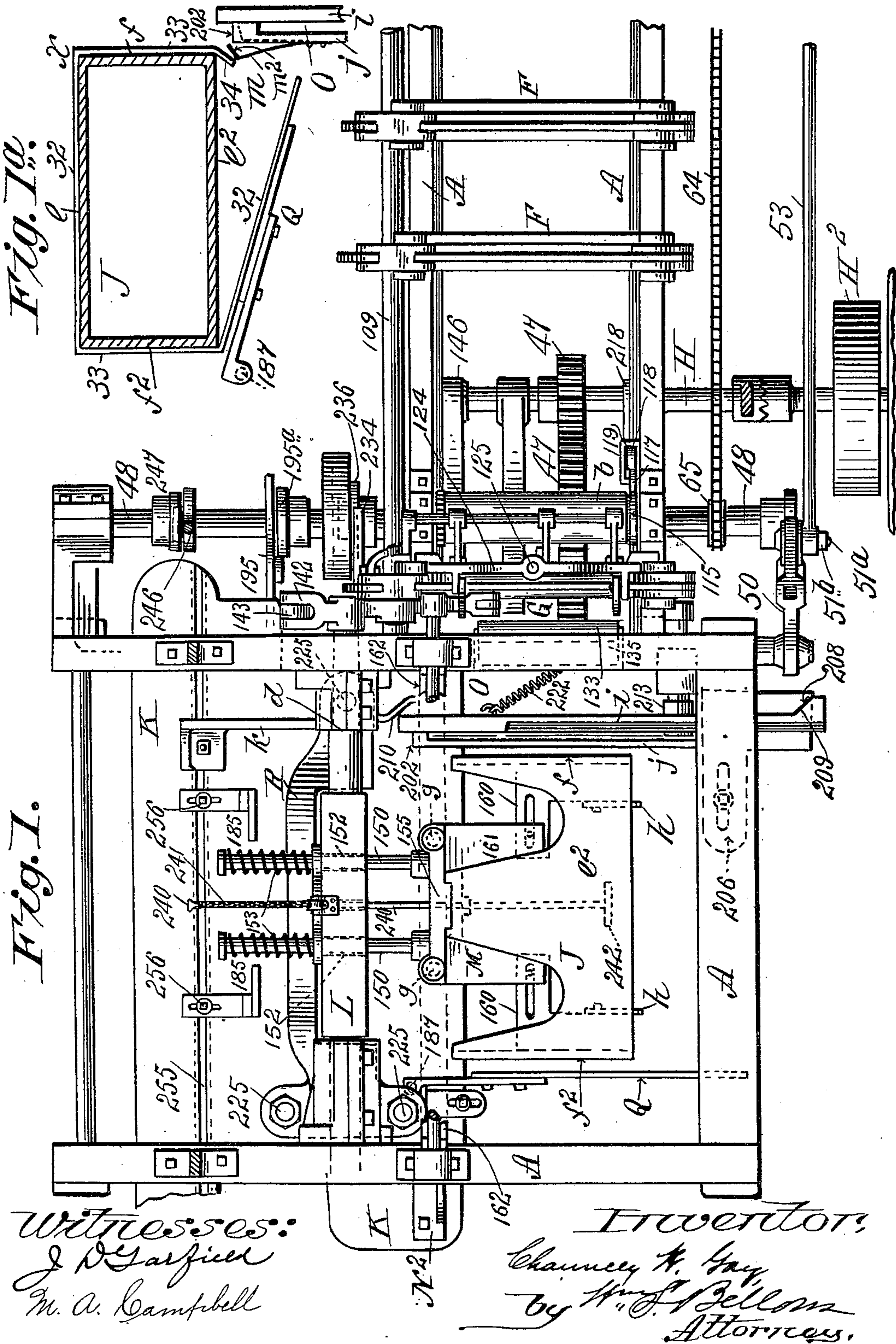
C. W. GAY.

MACHINE FOR MAKING PAPER BOXES.

(Application filed May 2, 1899.)

(No Model.)

14 Sheets—Sheet 1.



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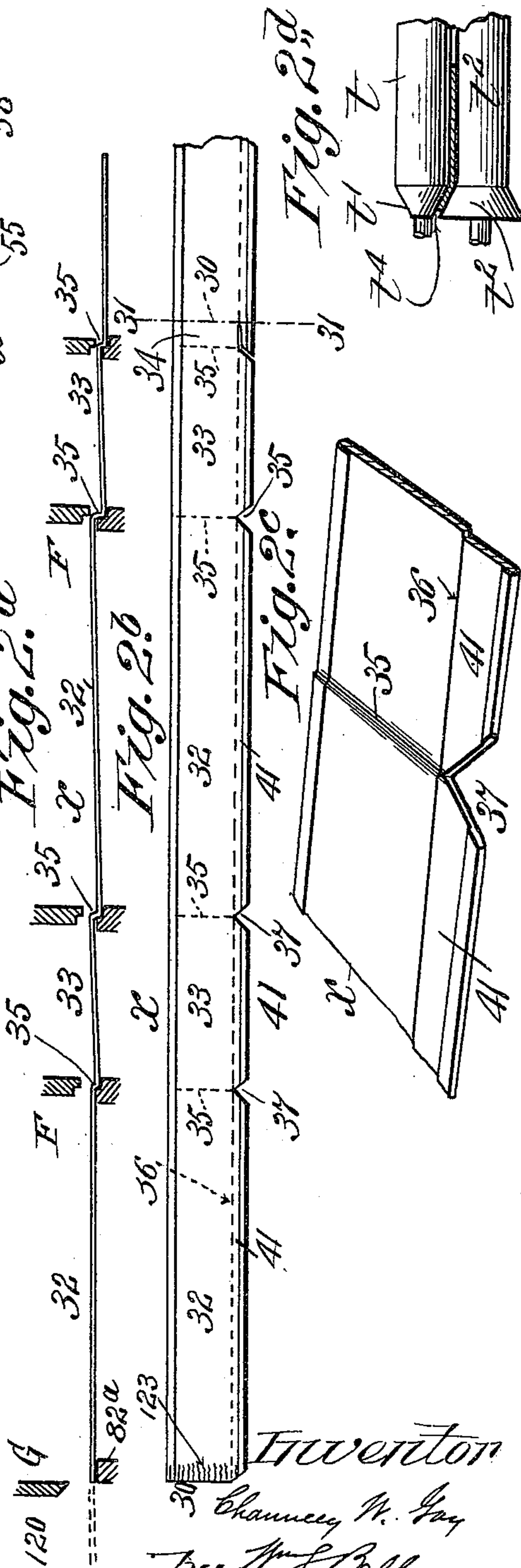
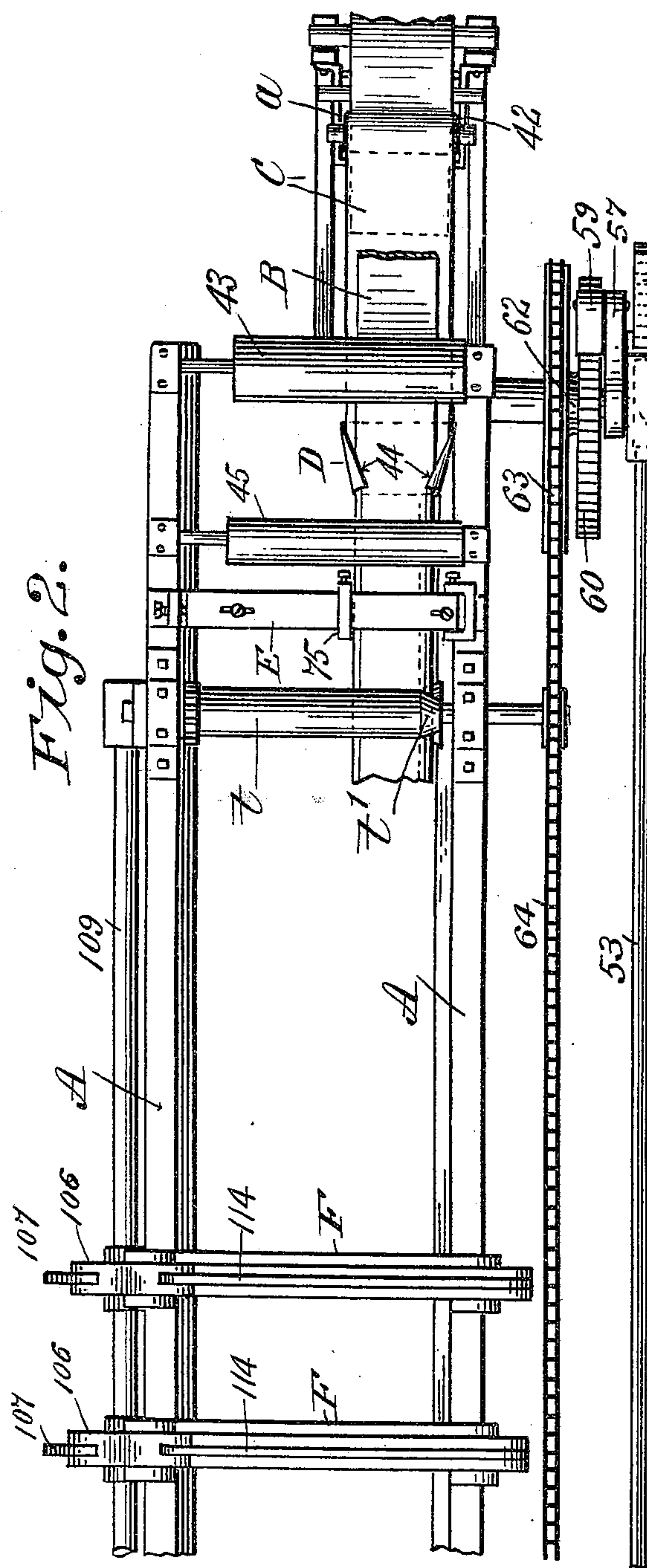
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14 Sheets—Sheet 2.



Witnesses:
J. D. Garfield
Mr. A. Campbell

N *Haverston*
Chamney W. Gay
by W. J. Bellows
Attorney.

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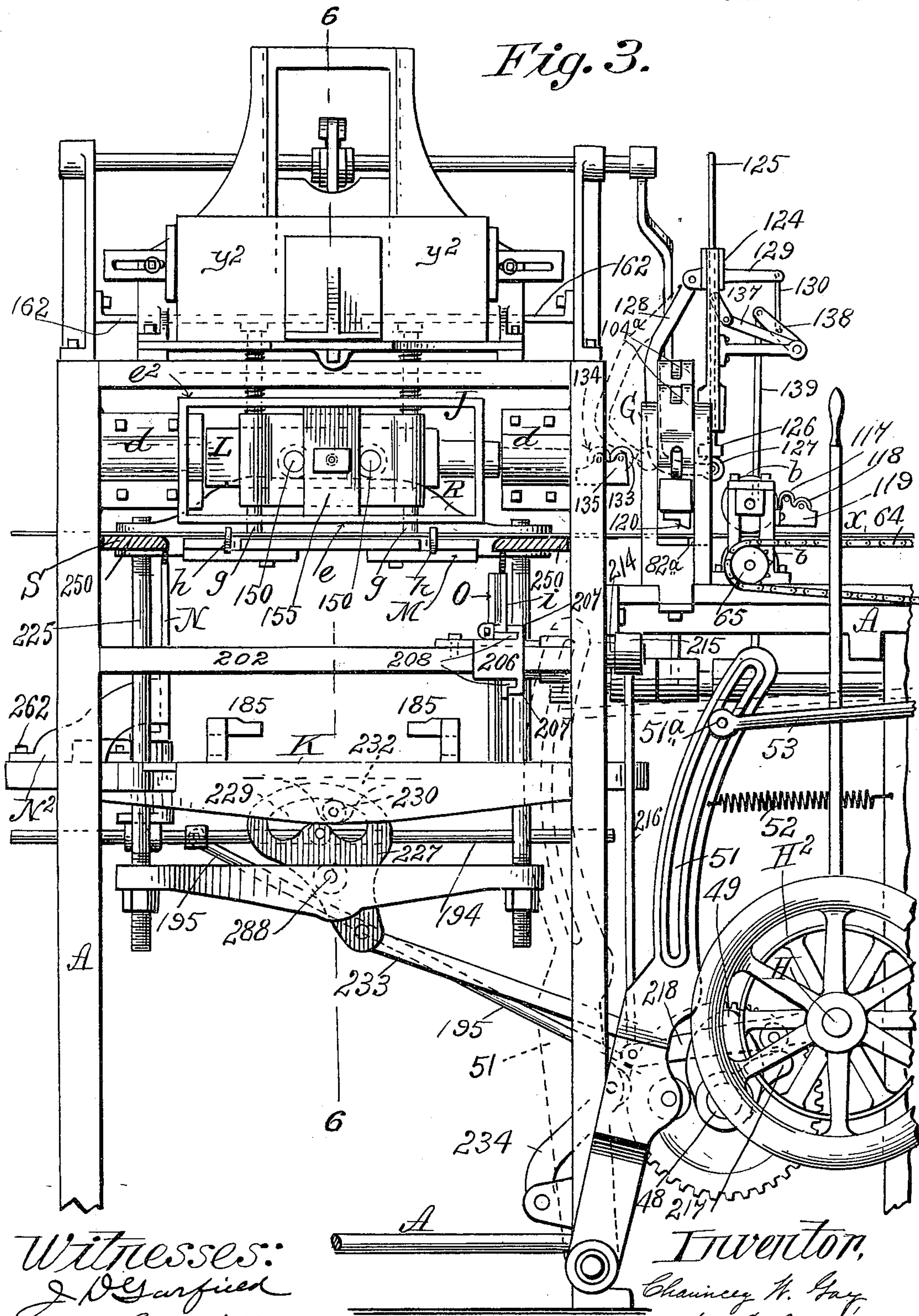
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(No Model.)

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Witnesses:
J. D. Garfield
W. A. Campbell

Inventor,
Chauncey W. Gay,
by H. F. Bellows
Attorney.

No. 645,950.

Patented Mar. 27, 1900.

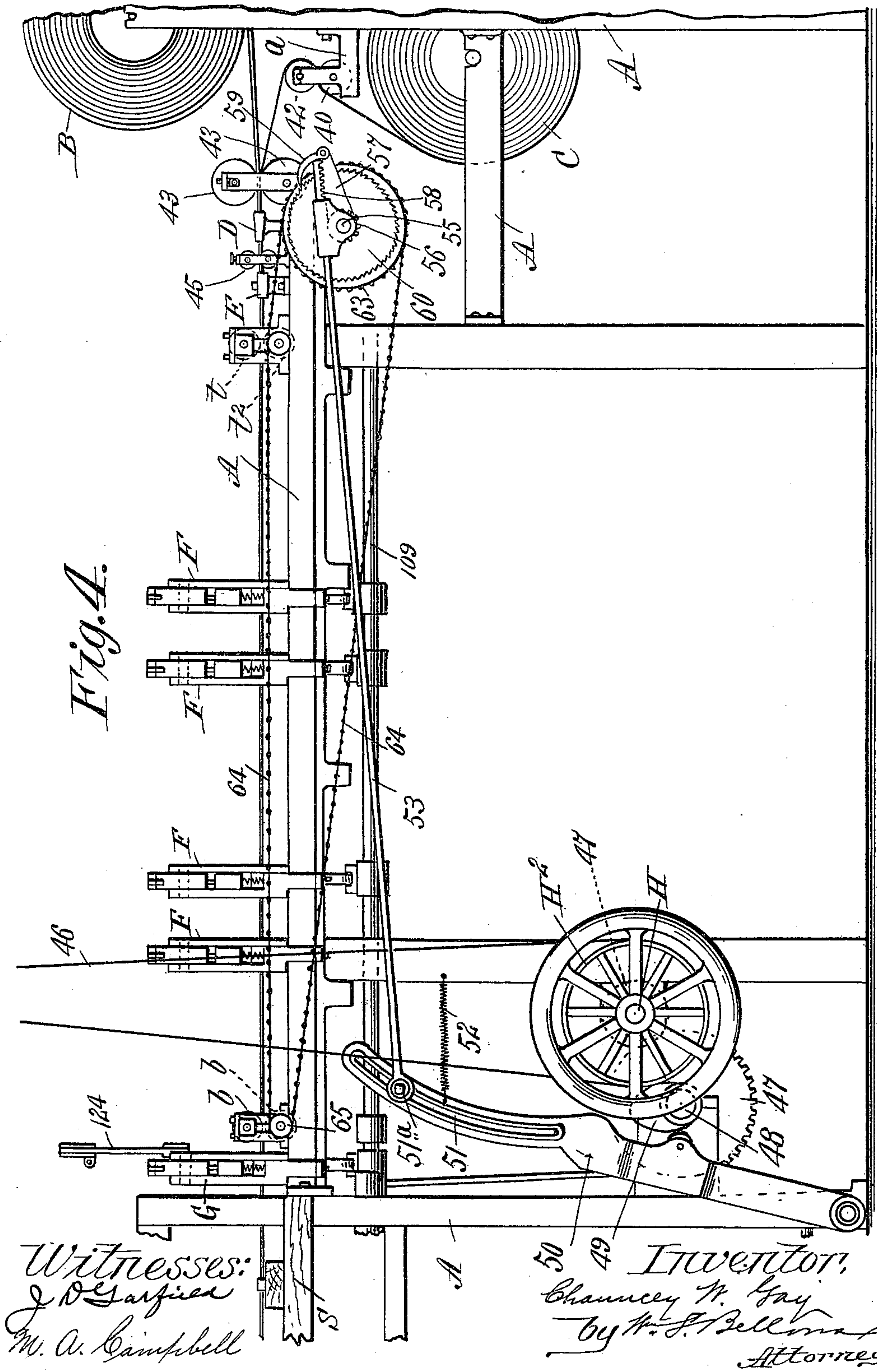
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Witnesses:
J. D. Garfield
M. A. Campbell

Inventor:
Chauncey W. Gay
by W. J. Bellman
Attorney.

No. 645,950.

Patented Mar. 27, 1900.

C. W. GAY.

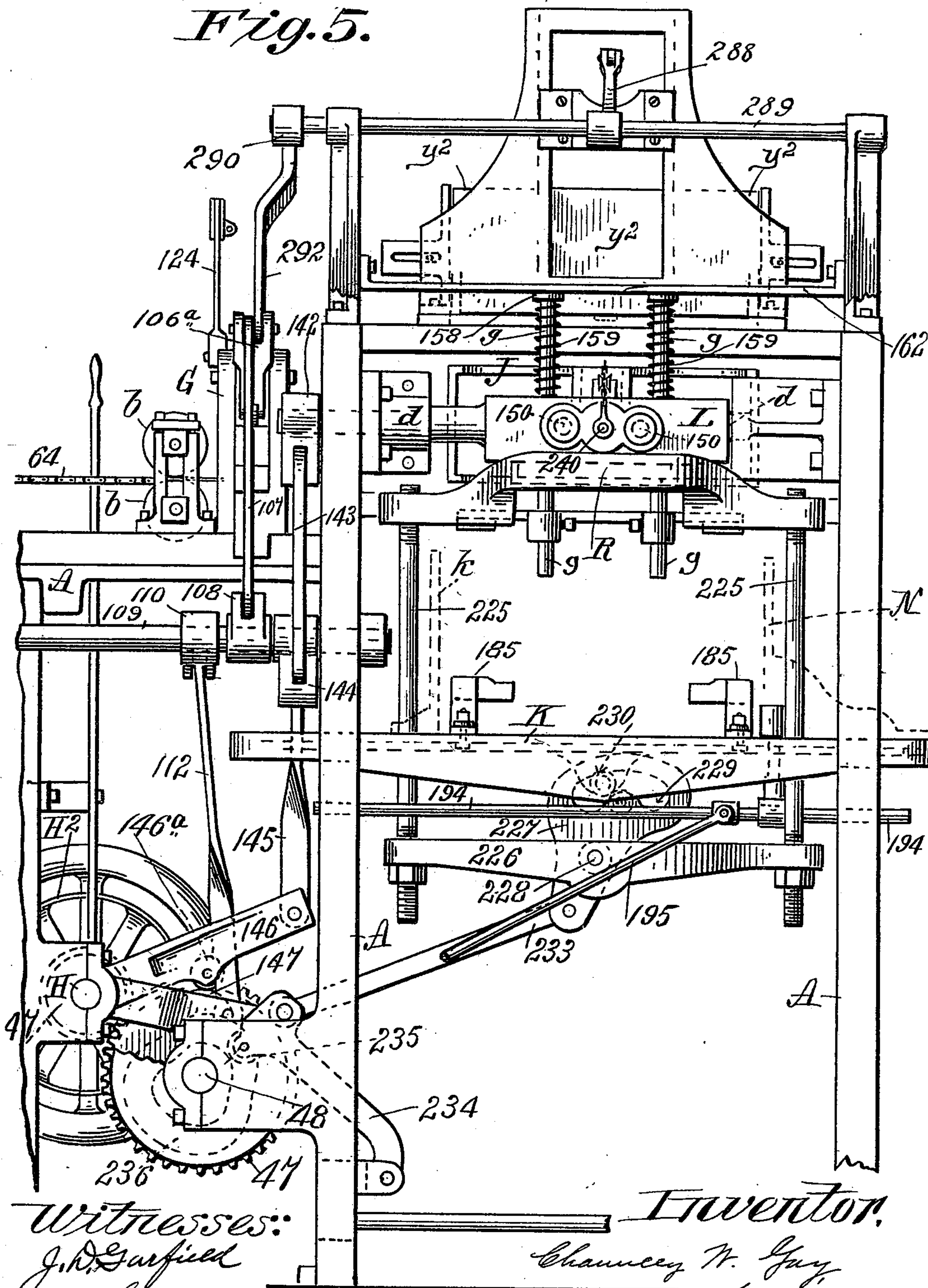
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Fig. 5.



Witnesses:
J. D. Garfield
M. A. Campbell

Inventor,
Chauncey W. Gay
by Wm. F. Bell
Attorney.

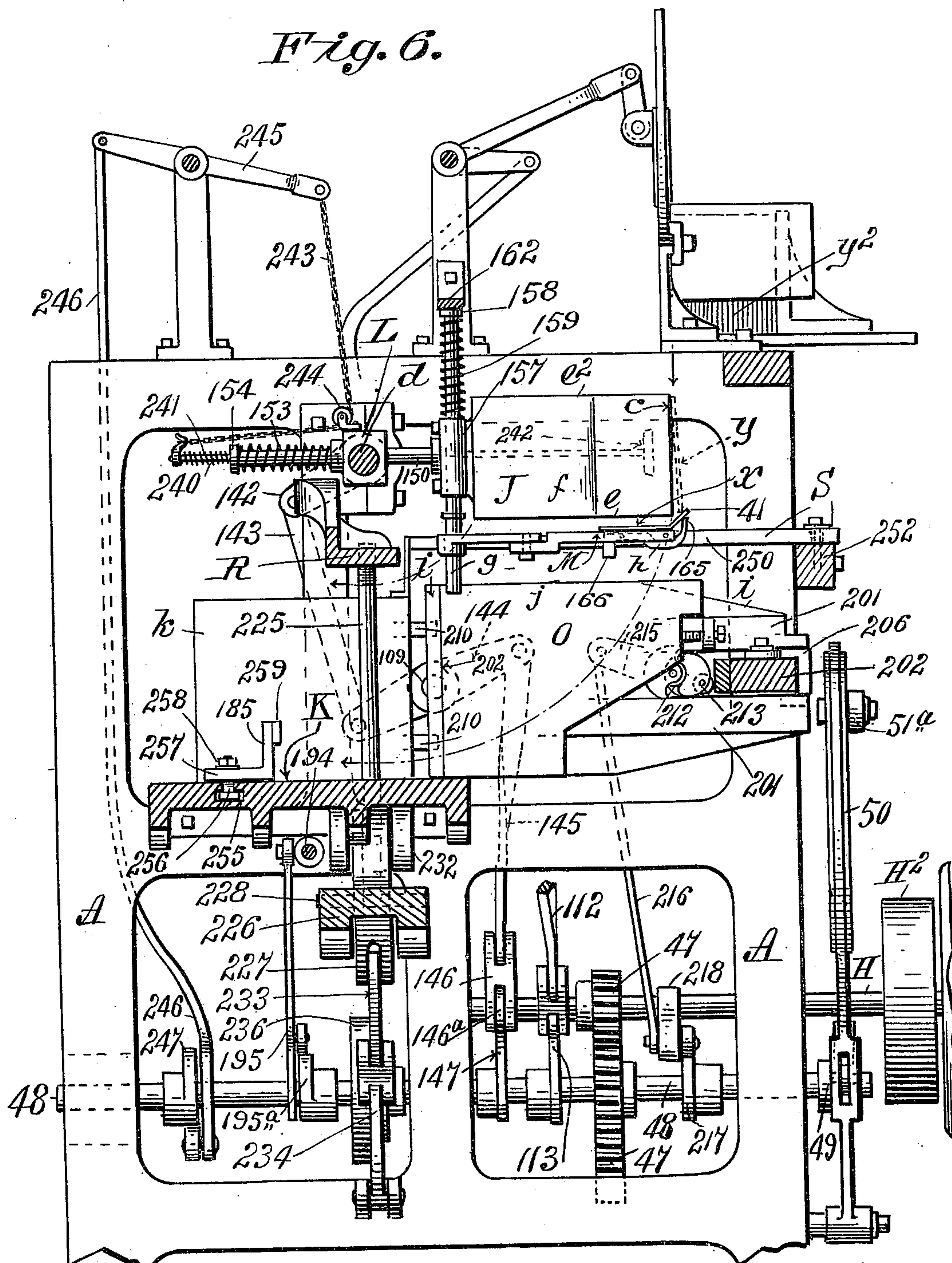
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MACHINE FOR MAKING PAPER BOXES.

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(No Model.)

Fig. 6.



Witnesses:
J. D. Garfield
M. A. Campbell

Inverton,
Chauncey W Gay
by Wm. L. Bellows
Attorney.

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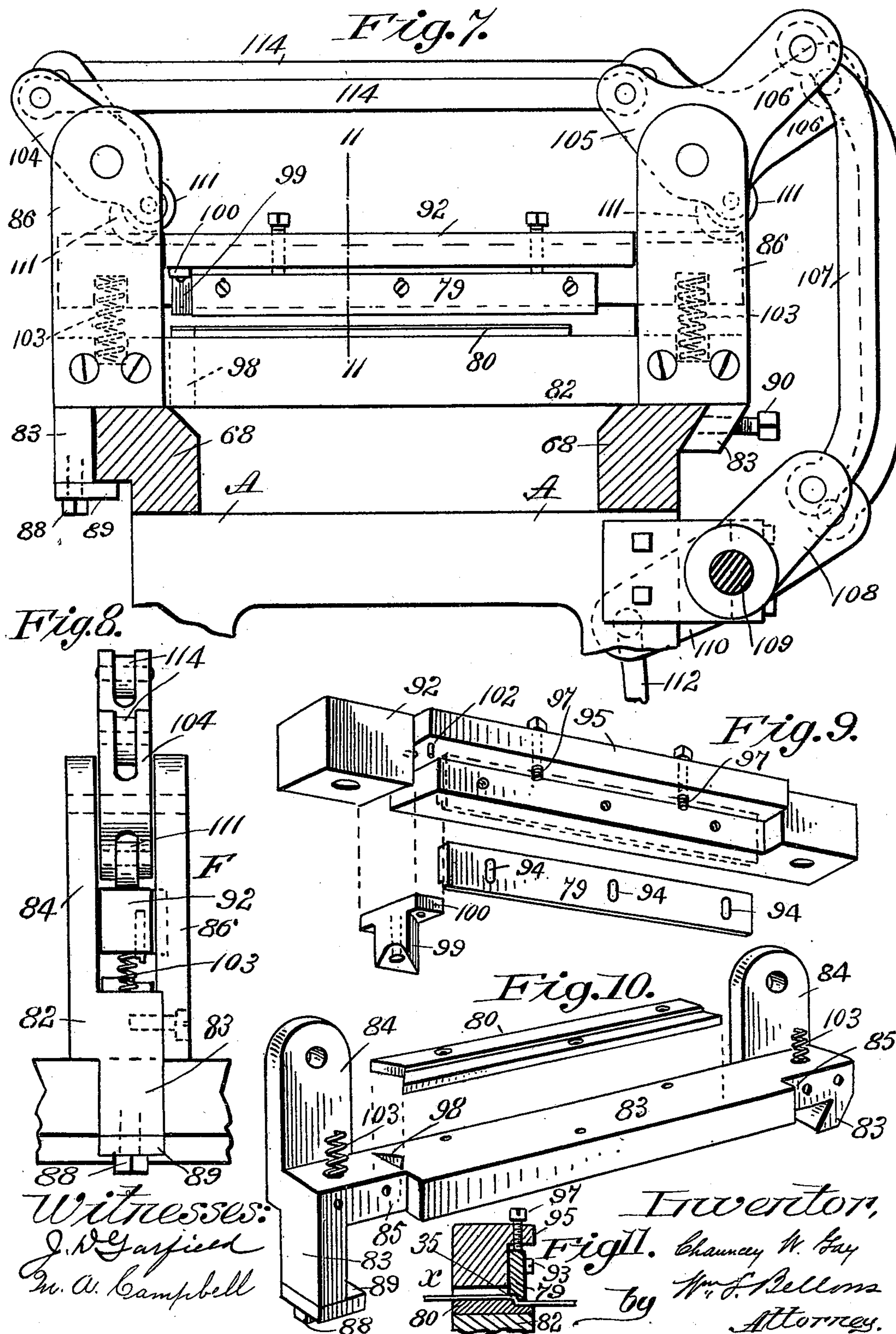
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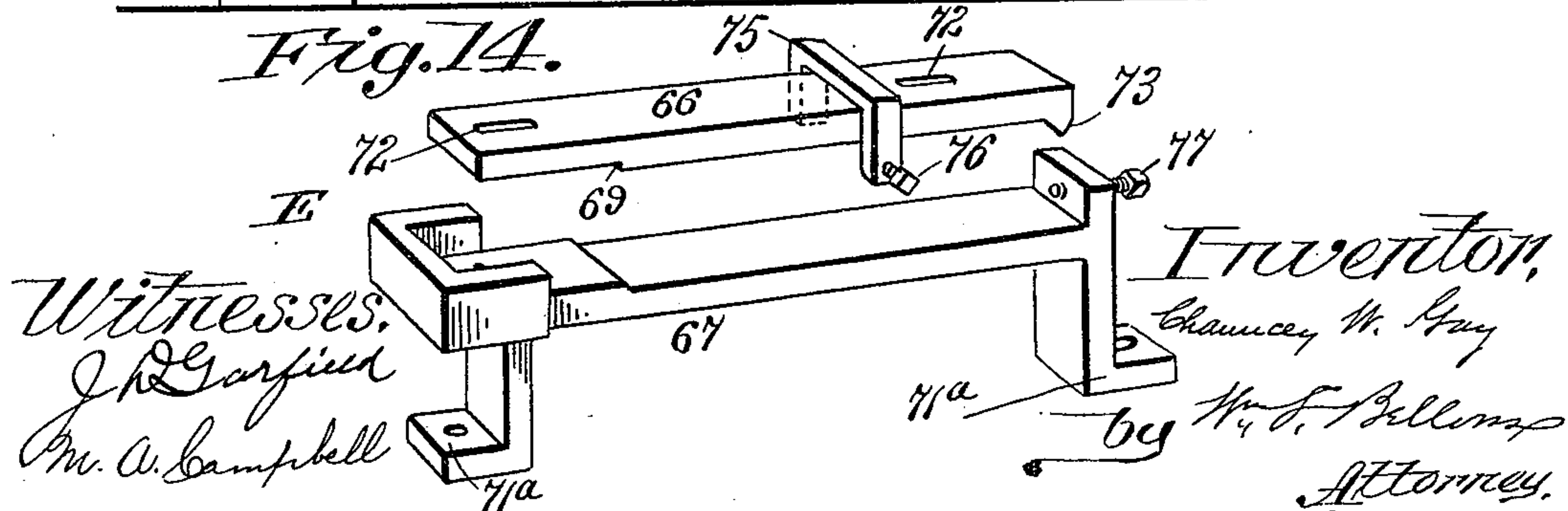
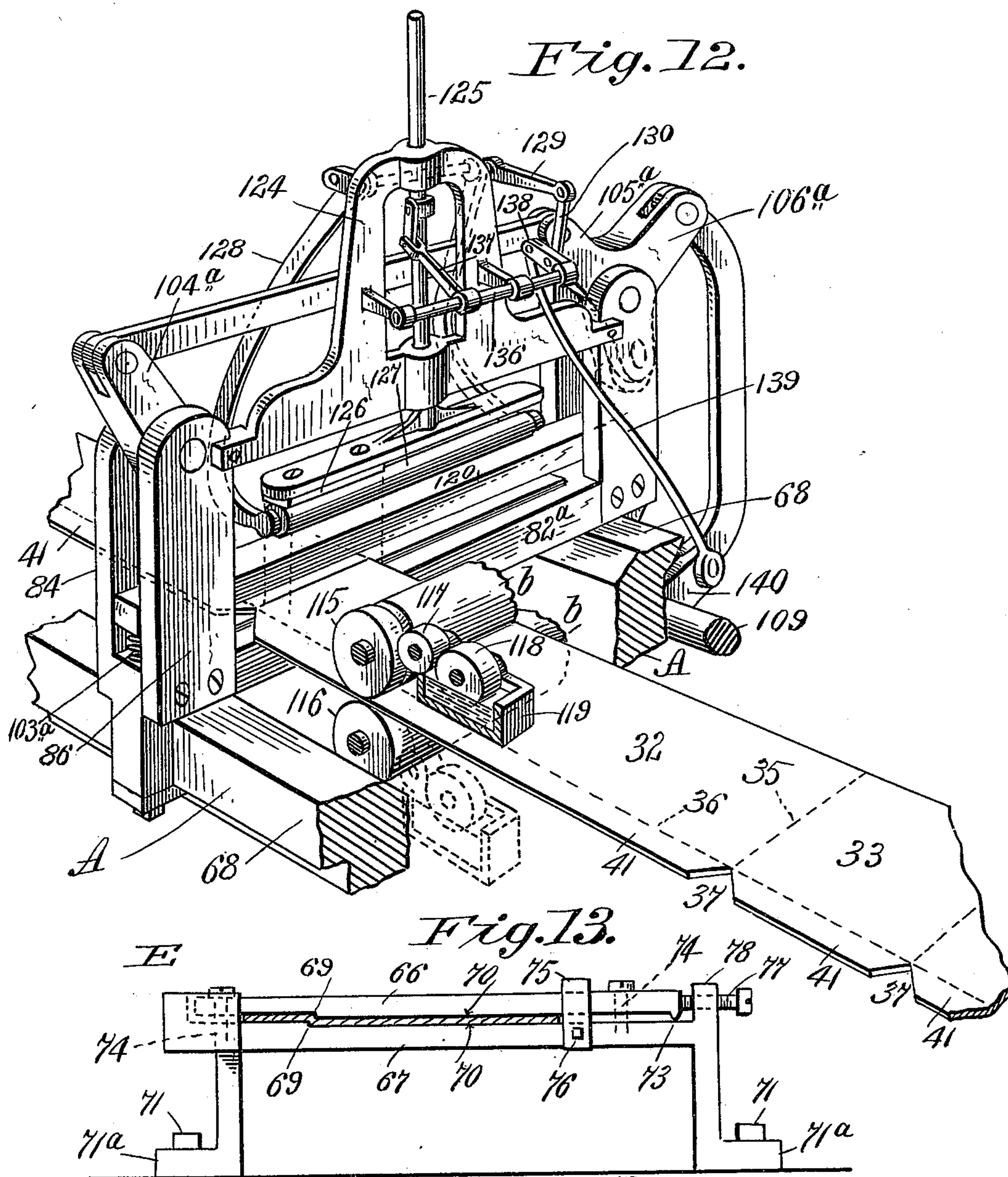
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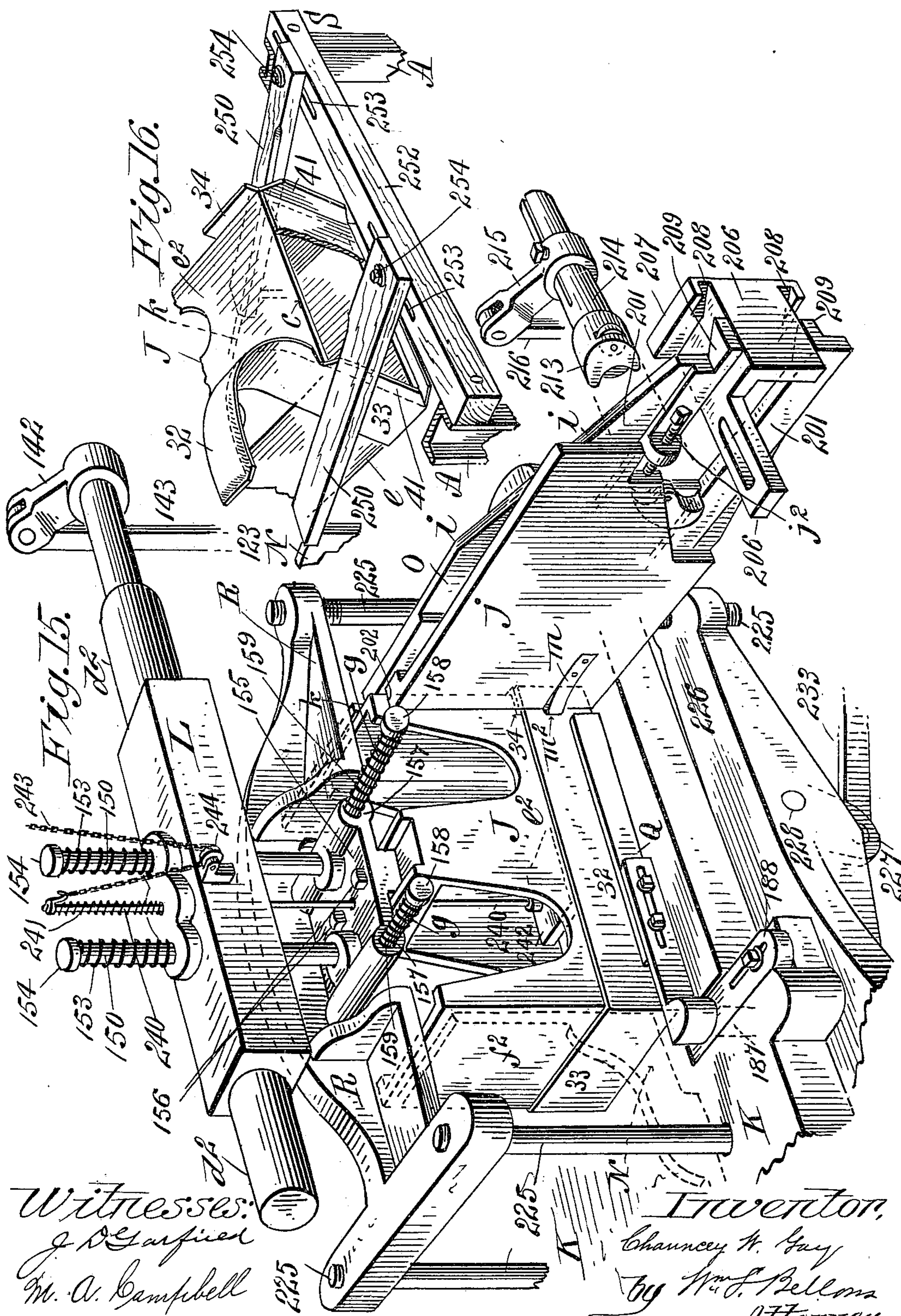
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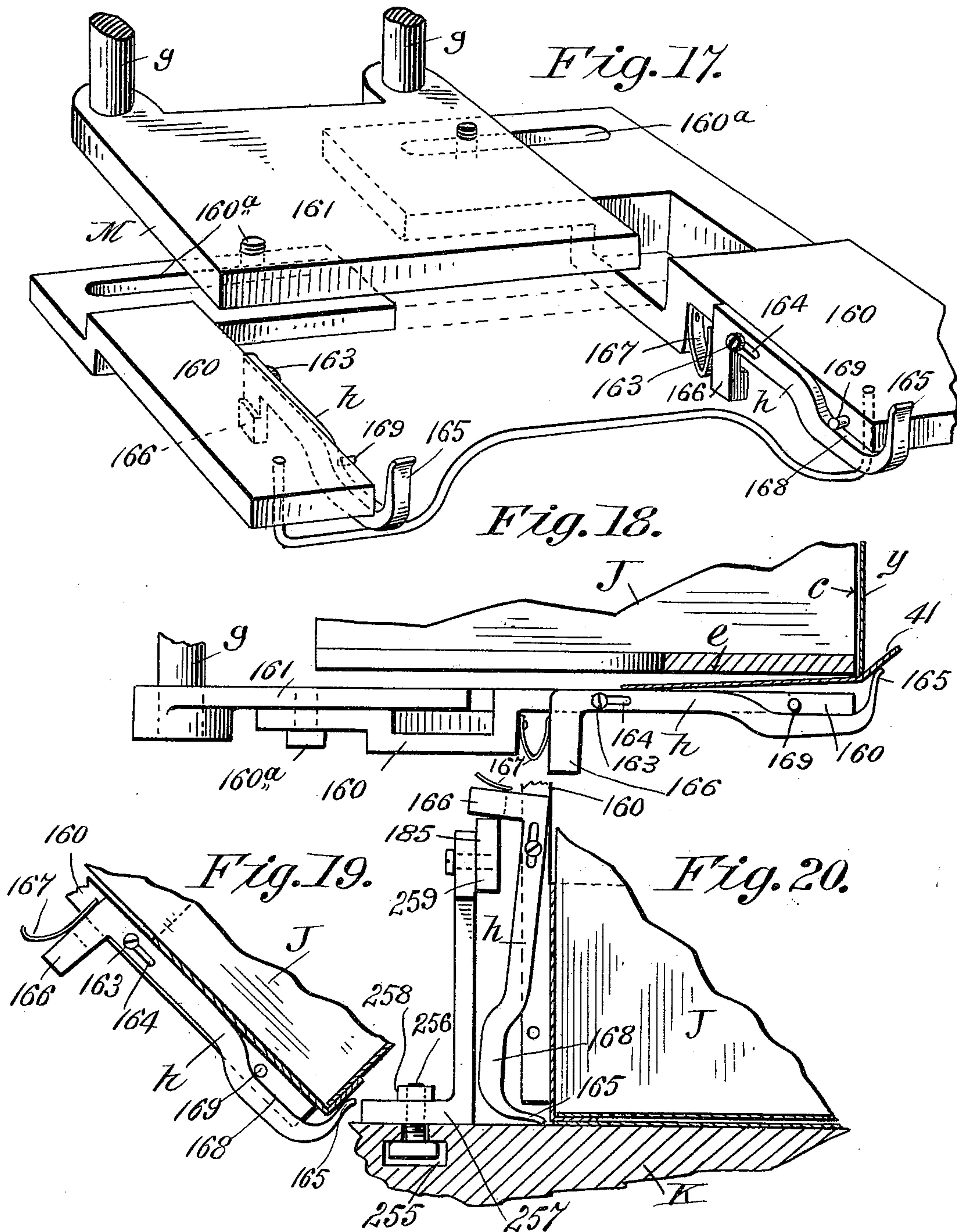
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(No Model.)

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Witnesses:
J. D. Garfield
M. A. Campbell

Inventor:
Chauncey W. Gay
by Wm. S. Bellom
Attorney.

No. 645,950.

Patented Mar. 27, 1900.

C. W. GAY.

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14 Sheets—Sheet II.

Fig. 21.

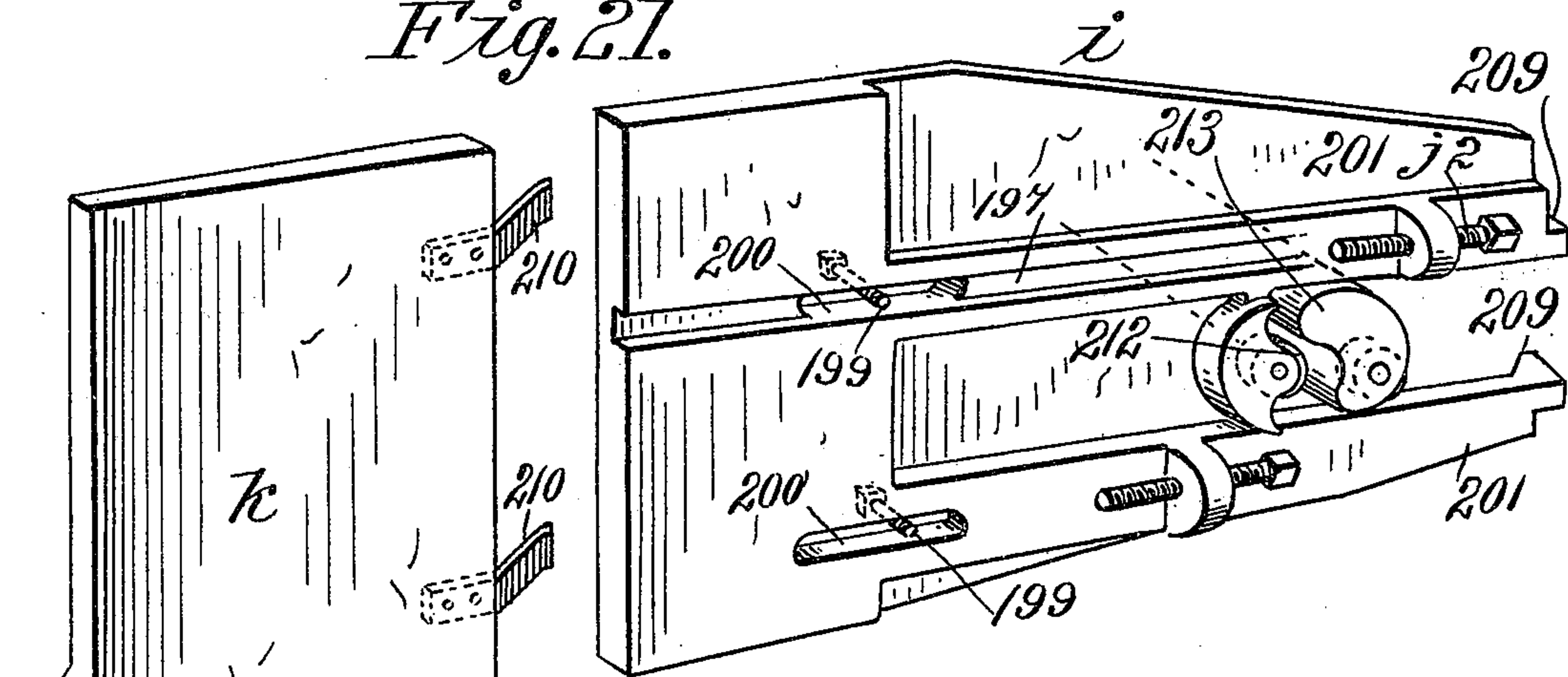


Fig. 21a.

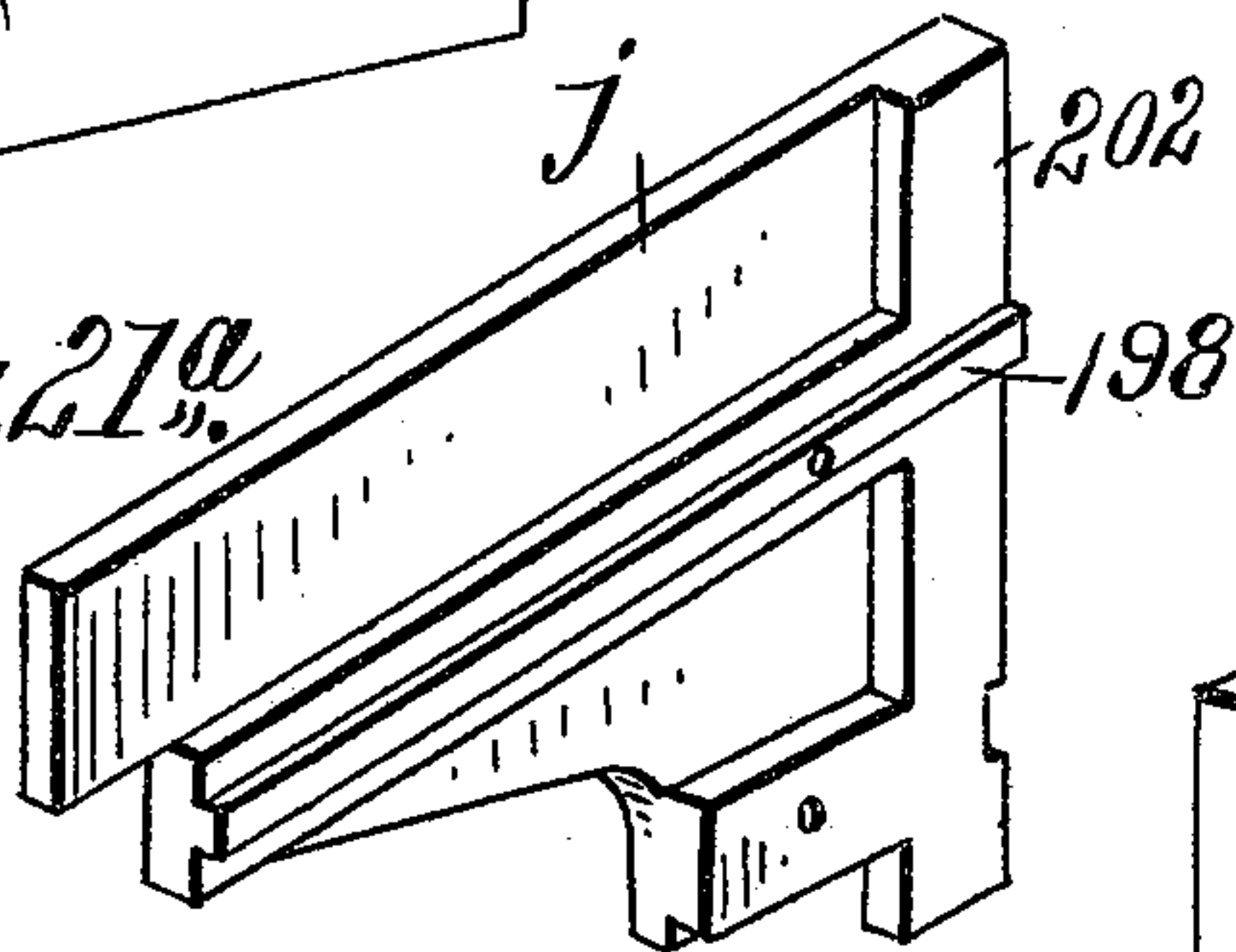


Fig. 22.

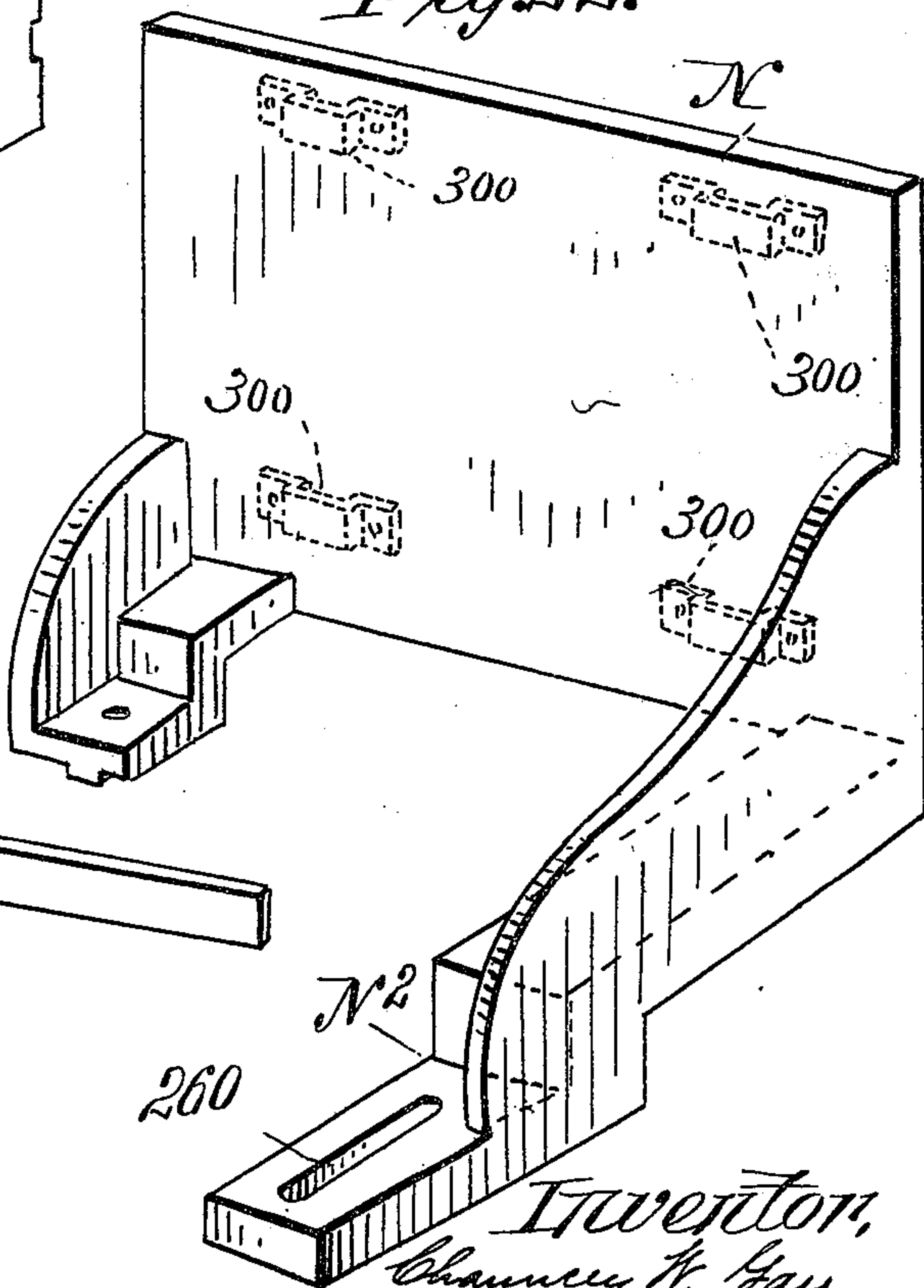
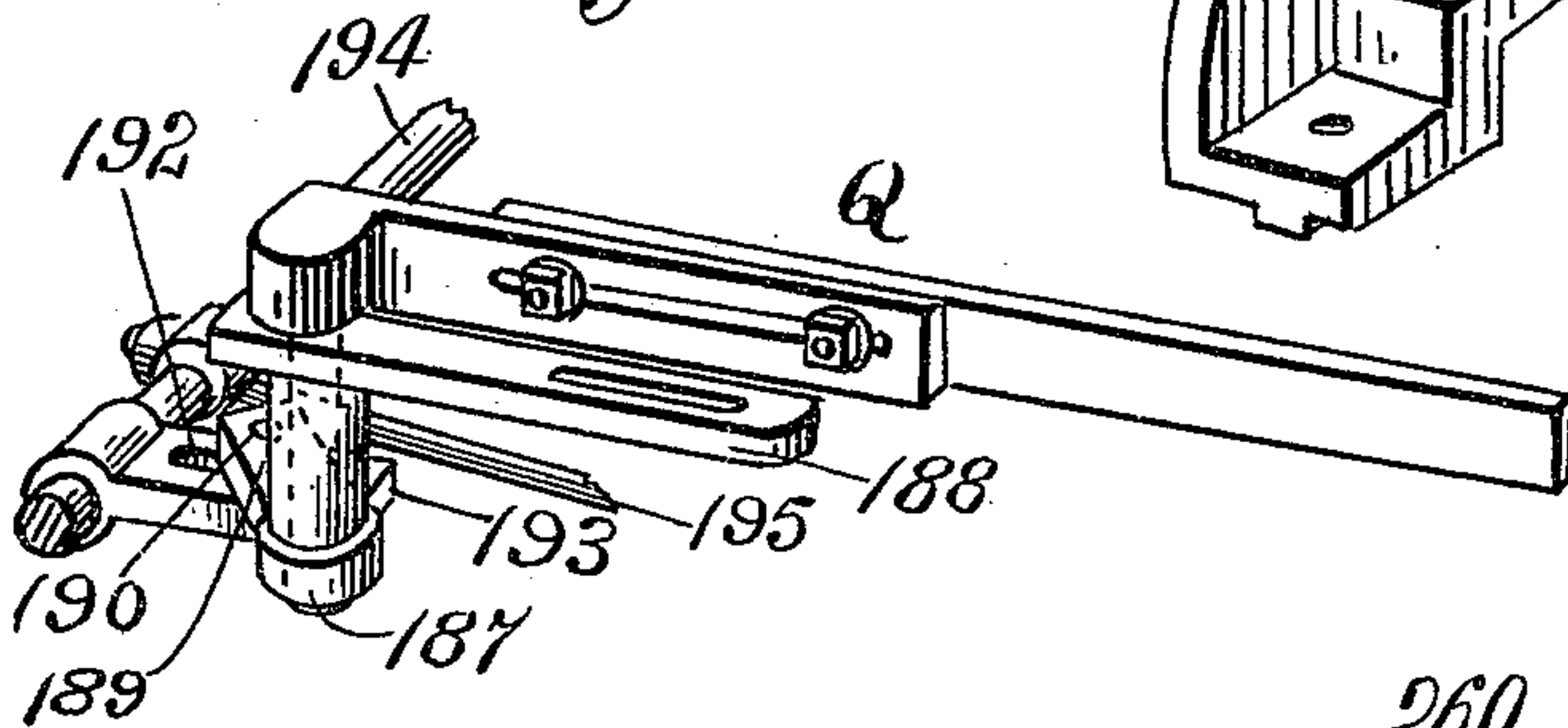


Fig. 23.



Witnesses:
J. H. Garfield
M. A. Campbell

Inventor,
Chauncey H. Gay
by A. J. Fellows
Attorney.

No. 645,950.

Patented Mar. 27, 1900.

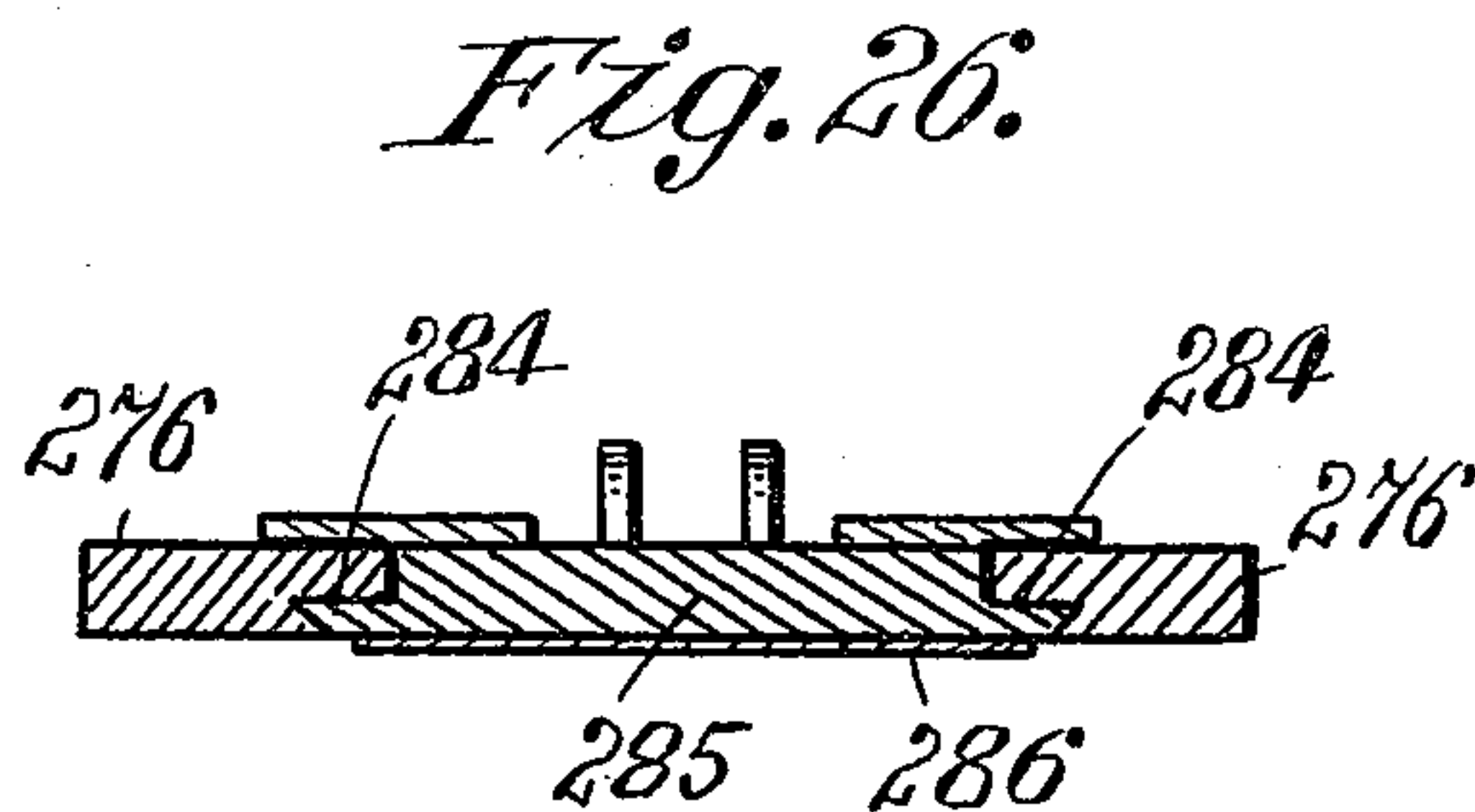
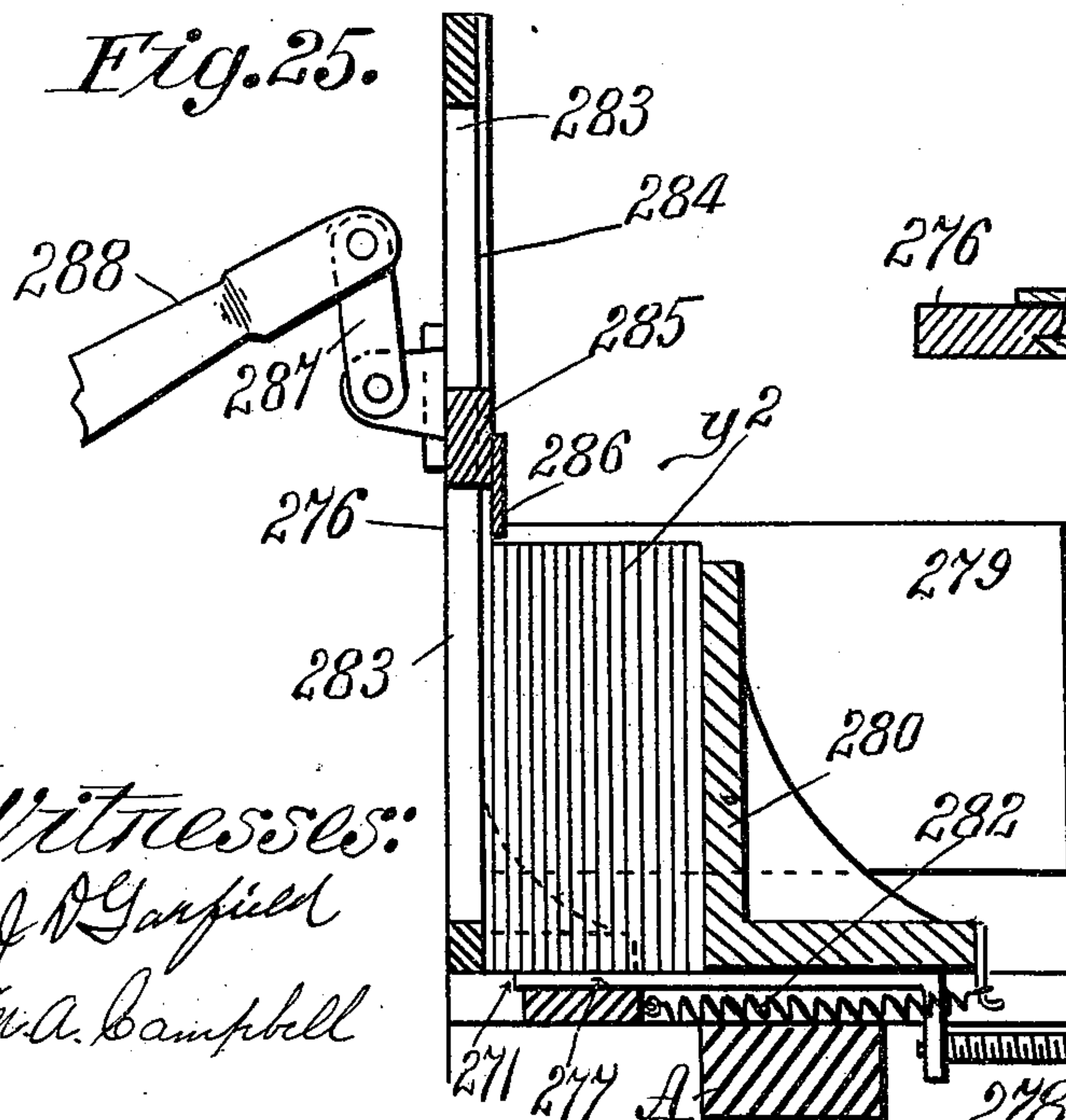
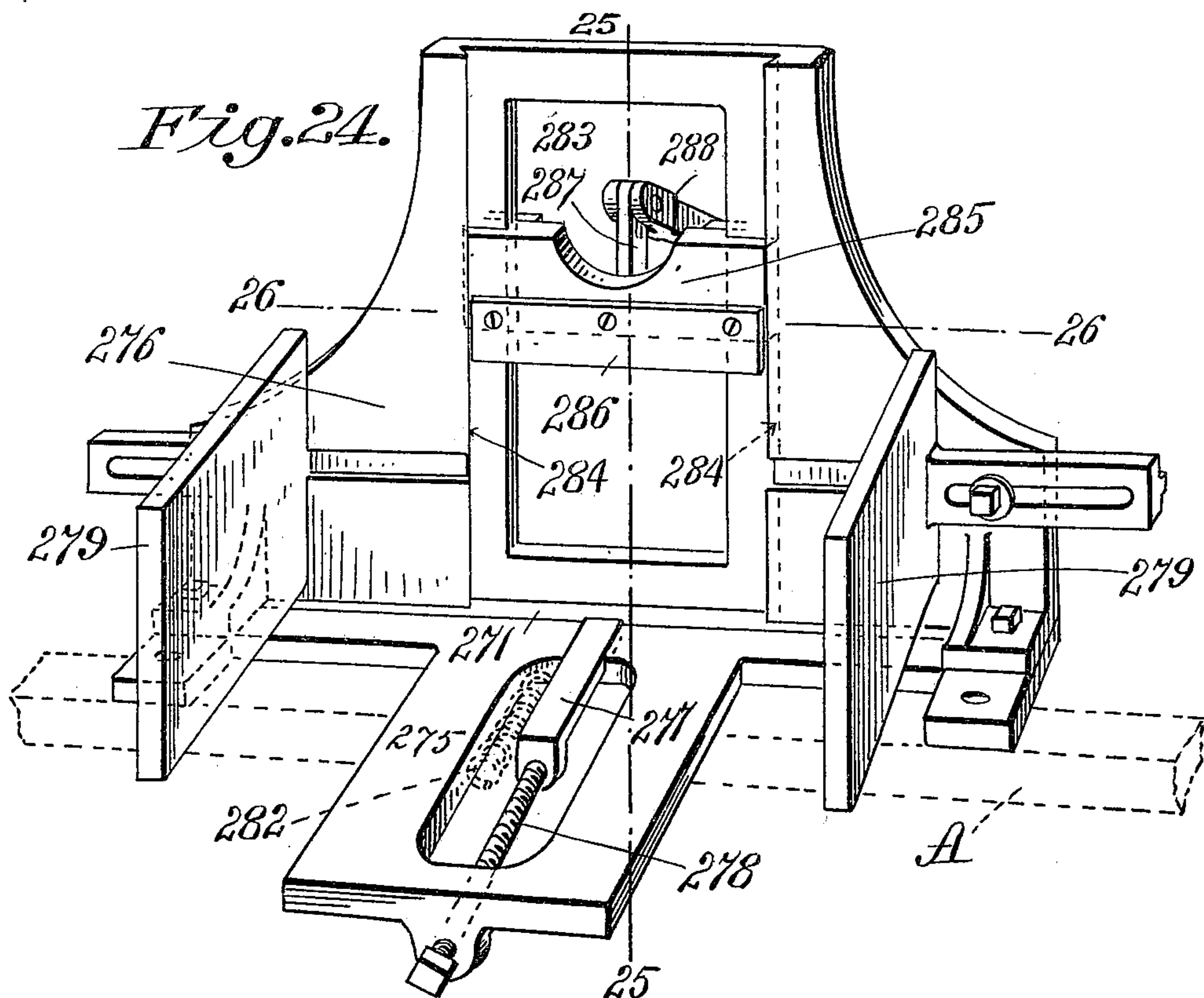
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(No Model.)

14 Sheets—Sheet 12.



Witnesses:
J. D. Garfield
M. A. Campbell

Inverton,

275 Chauncey W. Gay

by Wm. L. Bellon
Attorney.

No. 645,950.

Patented Mar. 27, 1900.

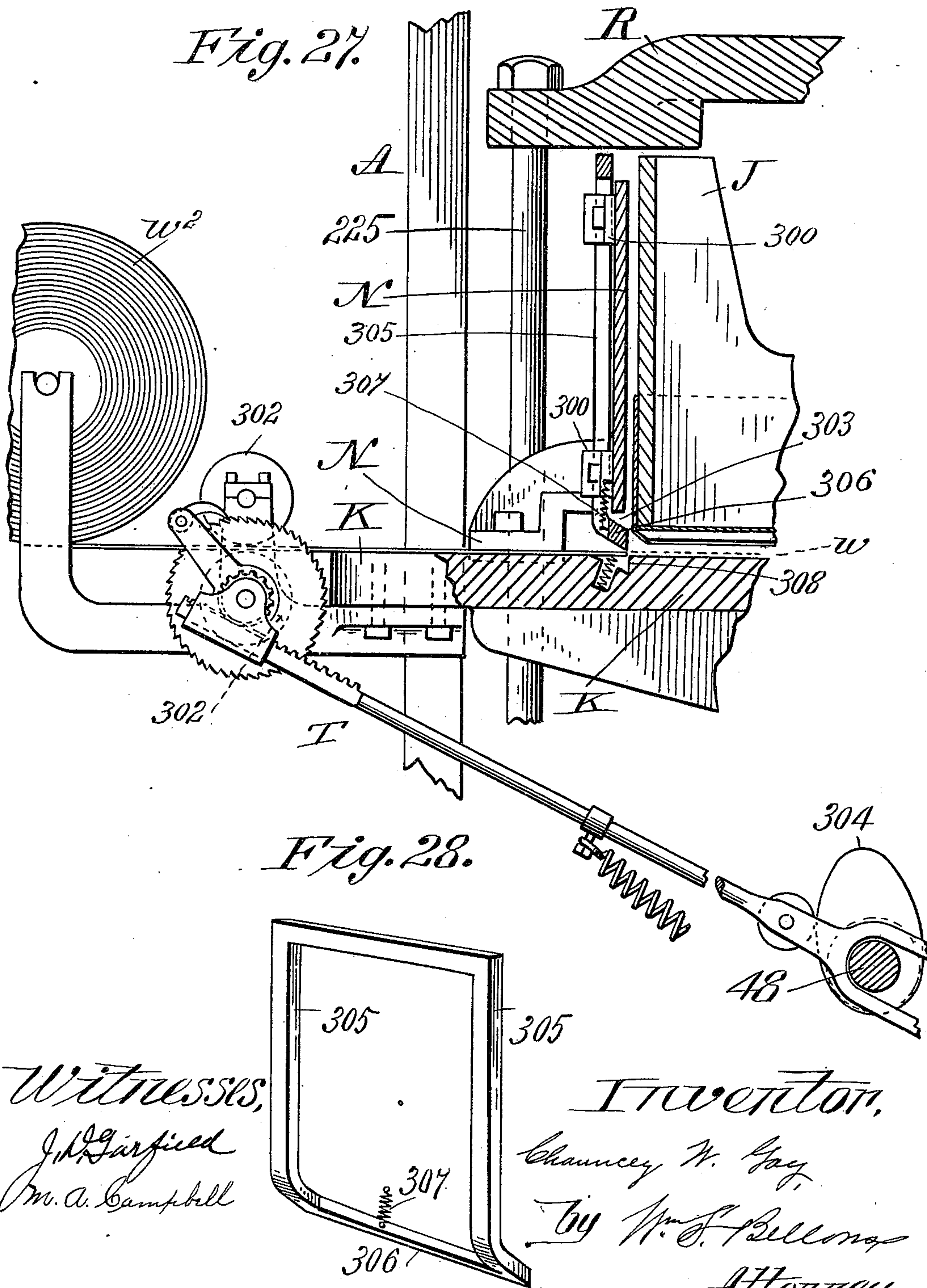
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Fig. 29.

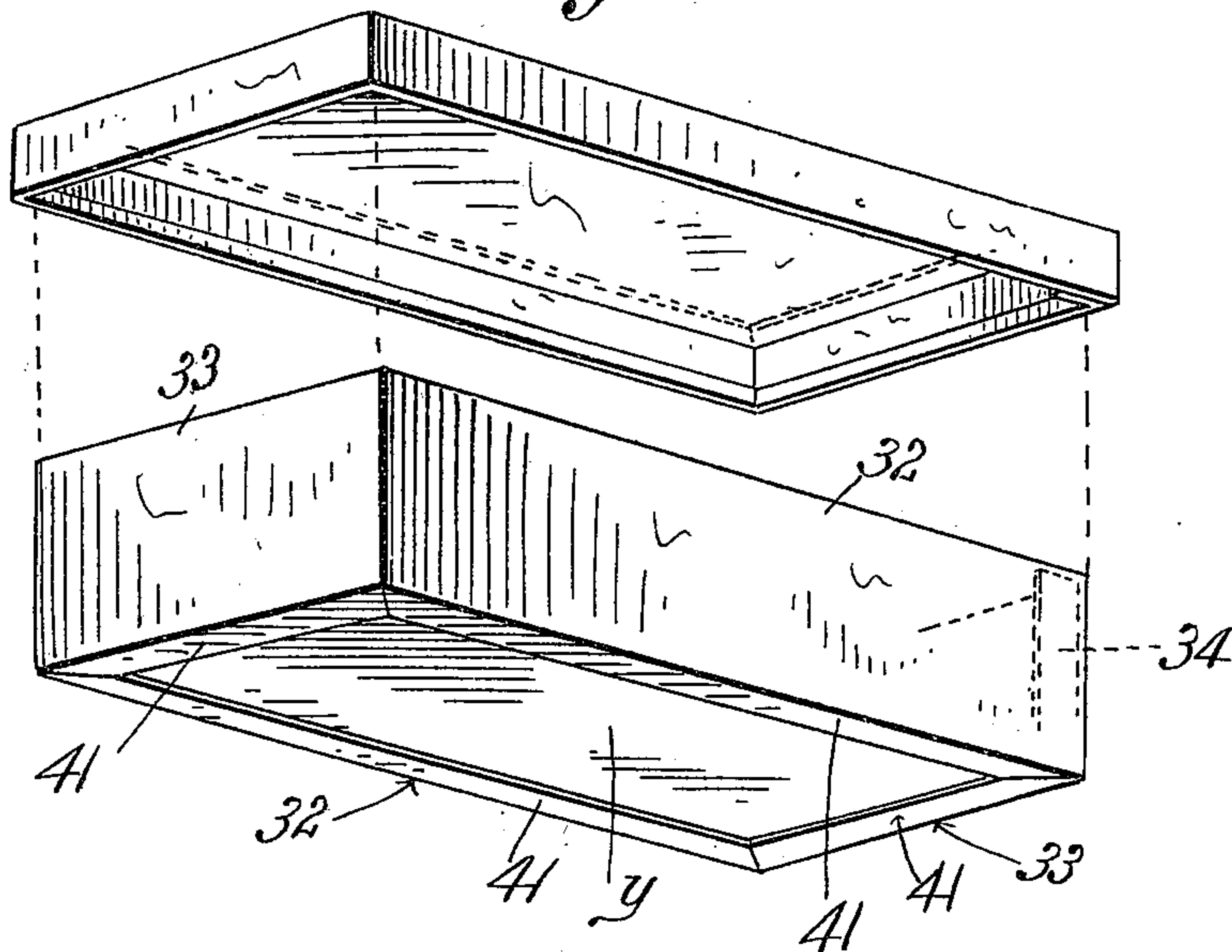
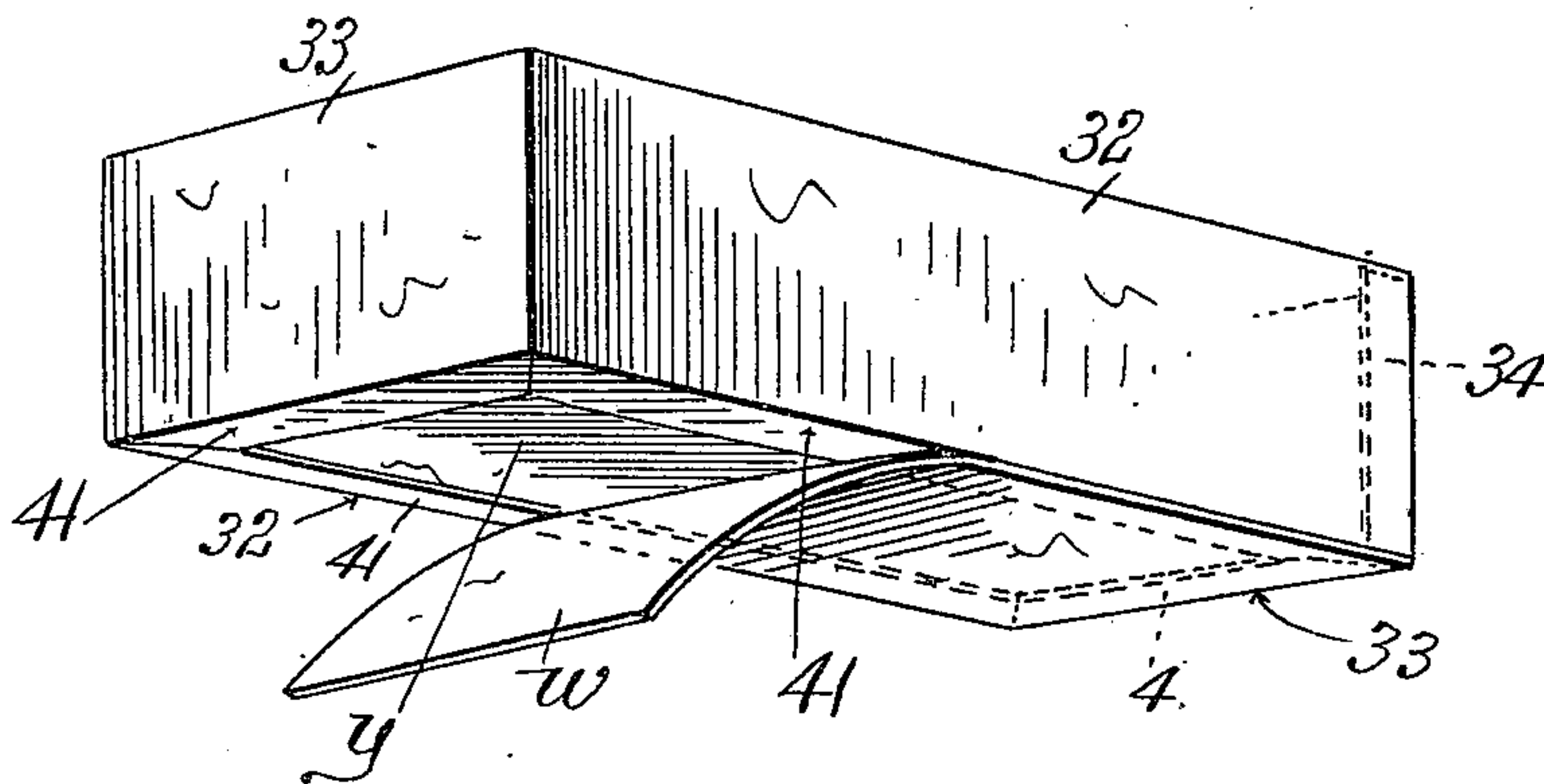


Fig. 30.



Witnesses:

J. D. Garfield

M. A. Campbell

Inventor,

Chauncey W. Gay

by *Wm. H. Bellamy,*
Attorney.

Attorney.

UNITED STATES PATENT OFFICE.

CHAUNCEY W. GAY, OF SPRINGFIELD, MASSACHUSETTS.

MACHINE FOR MAKING PAPER BOXES.

SPECIFICATION forming part of Letters Patent No. 645,950, dated March 27, 1900.

Application filed May 2, 1899. Serial No. 715,330. (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 Machines for Scoring Blanks and Making Paper Boxes, of which the following is a full, clear, and exact description.

10 This invention relates to machinery designed for the rapid and economical manufacture of paper boxes of various sizes within a wide range of dimension and of a strong and durable kind, the production thereof being, 15 moreover, with a minimum of waste stock.

The description of box which is made on this machine is formed from a portion of card or straw board or other suitable paper-box material having four sections constituting the 20 four sides of the box, a side stay flap or section for uniting two of the sides where they meet at one vertical corner of the box, and four flaps or stay-sections by means of which the box sides are united by sticking to the 25 box-bottom, which is constituted by a separate blank, or in some cases the bottom may be composed of separate double-bottom blanks.

The machine as I have devised and constructed it is capable of automatically performing all the operations of making surface-covered paper boxes or paper-box covers from a suitably-supplied heavy paper, card or straw board, and a suitable covering or surface-finishing paper; but certain of the mechanisms 35 or appliances may be omitted or portions of the compound machine shown may be employed for useful results independently of other portions of the machine—as, for instance, the covering or the blank-making mechanism may be 40 used without being in combination with a box-making machine, the blanks so formed being made into boxes by hand or by machinery, as elected, or the blank-forming mechanism may be used in conjunction with other box-making 45 mechanism than that herein described, and again the box-making mechanism may be used for making boxes from the blanks of the kind herein described when introduced thereinto by hand or by any suitable automatic 50 feeding mechanism.

In the operation of the entire machine card or straw board to constitute the four sides of

the box, the side stay-section, and the four bottom stay-sections is supplied in a roll mounted on suitable bearings, and a roll of 55 covering-paper is also supplied. The comparatively-thick body material of strawboard and the covering or surface-finishing paper as they run are pasted and united facewise, the one on the other, and the edge portions 60 of the covering-paper are turned around and overlapped on the opposite side of the body-board. The continuously-running thicknesses are in their forward course of movement longitudinally “scored,” as herein 65 termed, but without the removal of any of the thickness of the stock, as required, to provide that the portion from which the stay-sections or flaps for the bottom are constituted may be turned on the proper lines angularly 70 to the portions which constitute the four sides of the box. The strip is then further scored transversely on the lines corresponding to the corners of the box, and the edge portion of the strip, beyond the longitudinal score, has angular sections thereof removed or is “mitered” 75 to permit the stay-sections or flaps for the bottom to be bent in the final making of the box angularly to the angularly-disposed sides without overlapping each other. The stay- 80 sections are surfaced with paste as the strip is in transit to the box-forming mechanism, which is in part constituted by a peculiarly-mounted plunger, around the sides of which the strip is to be wrapped, and when brought 85 to place properly relatively to the former the covered strip scored longitudinally and transversely, corner cut or mitered and pasted, is cut crosswise from the portion of the strip next behind. The section or blank of straw- 90 board or other material from which the bottom is to be formed is fed into place at the turned-up bottom of the plunger. The operation of wrapping the strip around the former is next performed in part by a peculiarly bodily motion given to the former, and 95 in part by side-section turners and a side stay-section-turning device coacting therewith. The bottom flaps or stay-sections of the main blank brought at right angles to the 100 sides of the box—that is, against and overlapped on the marginal portions of the box-bottom of the former—are by pressure stuck and set, and the former about which the box

has been made having been next returned to its original position the completed box is stripped or caused to be shed from the former, into relation with which latter newly-fed strips or blanks are again brought for repetitions of the box-making operations.

The invention consists in the combinations of mechanisms or instrumentalities, in the construction and combination of parts comprised in the individual mechanisms, and in a new method and means of making paper boxes, all substantially as hereinafter fully set forth, and covered in and by the claims.

Reference is to be had to the accompanying drawings, in which—

Figure 1 is a plan view of the box-forming portion of the machine, part of the blank preparing and feeding mechanism being also shown. Fig. 1^a is a horizontal cross-sectional view of the former, understood as having been brought into its vertical position and showing the blank which constitutes the box sides wrapped around it, the front-side turner and the stay-section turner and setting device being also shown. Fig. 2 is a plan view of the blank-preparing mechanism, a part of which is shown in Fig. 1. Fig. 2^a is a sectional view or diagram illustrating the successively-acting transverse creasers or scorers and the severing mechanism. Fig. 2^b is a plan view of the strip, showing the manner in which the same is mitered and longitudinally and transversely scored. Fig. 2^c is a perspective and sectional view of a part of the blank on a larger scale. Fig. 2^d is a view of deflecting-rolls for the blank. Fig. 3 is a front elevation of the box-making machine with a portion of the strip feeding and preparing mechanism adjoining. Fig. 4 is a side elevation of the mechanism for feeding, covering, scoring, and mitering the strip from which the blanks are cut in succession. Fig. 5 is a rear elevation of the box-making machine—that is, a view taken from the opposite side from Fig. 3. Fig. 6 is a vertical sectional view and elevation of parts beyond the plane of section, which is taken about on the line 6 6, Fig. 3. Fig. 7 is a cross-sectional view and front elevation of one of the sets of transverse scorers and corner cutting or mitering mechanisms, of which in the machine there are several, adjustably arranged in succession. Fig. 8 is a view as seen at the left-hand edge of Fig. 7. Fig. 9 is a perspective representation of the upper and movable portions of this mechanism, the component parts thereof being shown as separated. Fig. 10 is a perspective view of the lower and normally-immovable portions of the mechanism, parts thereof being shown separated for clearer illustration. Fig. 11 is a cross-sectional view vertically as taken on the line 11 11, Fig. 7, the portion of the blank or strip being transversely scored being indicated. Fig. 12 is a perspective view of the gumming mechanisms for the blank. Fig. 13 is a front elevation of the longitudinal scoring device,

the blank being lengthwise scored being indicated in cross-section. Fig. 14 is a perspective view of the parts of the longitudinal scorer. Fig. 15 is a perspective view of the mechanism which most intimately pertains to the box-forming operations. Fig. 16 is a perspective view of what I herein term an “adjustable” table provided suitably relatively to the former and onto which the blank constituting the box sides is run. Figs. 17, 18, 19, and 20 are perspective and sectional views of portions of the mechanism comprising the “grippers” as herein termed, for seasonably holding both blanks against the former and of the releasing means which operate in conjunction therewith, all to be hereinafter more particularly described and referred to. Figs. 21 and 21^a are perspective and detail views of part of the mechanism which coacts with the former in the setting of the stayed corner portion of the box. Fig. 22 is a perspective view of an adjustable fixture or appliance serving as a turner for the blank. Fig. 23 is a perspective view of the turning device for the front side section of the box-blank. Fig. 24 is a perspective view of the “shovel-feed” mechanism for automatically feeding the blanks which constitute the box-bottom into relation to the bottom of the former to be united with the bottom stay-sections of the box sides. Fig. 25 is a vertical cross-sectional view through said shovel-feed mechanism for the bottom blanks on line 25 25. Fig. 26 is a cross-sectional view on line 26 26. Fig. 27 is a sectional elevation of an attachment and mechanism for feeding from a continuous roll or supply and severing from such supply a second bottom also to the former. Fig. 28 is a perspective view of the severing-knife in said last-mentioned mechanism. Fig. 29 is a perspective view of a box and cover having, respectively, single bottom and single top, as produced on the present machine. Fig. 30 is a perspective view of the box having double bottom as also capable of being produced on this machine.

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

The blank or strip from which the four sides of the paper box are constituted is illustrated in Fig. 2^b, the blank sufficient to constitute such parts of the box being comprised between the transverse lines 30 and 30, 32 32 representing the sections which constitute the wider sides of the box, 33 33 the relatively-intermediate sections which constitute the narrower sides or ends of the box, and 34 represents the side stay-section, which is overlapped within the side section 32 farthest therefrom in the making of the blank into the box, as indicated in Fig. 15.

41 41 represent the portions of the blank to be gummed and which constitute the “bottom stay-sections”—that is, the parts of the blank which are ultimately turned angularly to the sides and by means of which the sides are joined to the bottom of the box.

35 35 represent the lines of "transverse scoring," as herein termed, this scoring in the operation of the present machine consisting in creasing the blank in a step-like manner, as indicated in an exaggerated way in Fig. 2^a, and without the removal of any of the stock, as is often done by plow-scoring, and the blank has imparted thereto a continual longitudinal scoring 36 of similar step-like character.

37 indicates the miters or portions from which angular sections of the stock are removed.

Suitable framing having fitness to the purposes of constituting supports for the mechanism journal-bearings and their appliances are shown and indicated by the letters A A and will now be described.

B represents the supply-roll of strawboard, millboard, or other analogous appropriate material from which paper boxes are commonly made journaled at the right-hand end of the frame.

C represents the supply-roll of covering and finishing paper or material below the roll B.

a is a paste-box; 40, a paste-roll therein; 42, a pressure-roll between which and the paste-roll the paper B runs, receiving a coating of paste on its entire under side.

The covering-paper C is supplied usually wider than the strawboard B, and the strawboard and pasted cover-paper are together brought between and united by the pressure-rolls 43 43, and thence pass through the overturning device D (which in itself is not a new device) for overturning the marginal portions of the covering-paper around the edges and overlapped on the marginal portions of the strawboard, as shown in Fig. 2^c.

The overturning device D, as more plainly seen in Fig. 2, consists in the horizontally-arranged plate having the overturning lips 44 44, which are convergent in the line of travel of the material. The covered and edge-lapped material thence passes between the pressure-rolls 45 45 for causing the overlapped portions of the covering-paper to adhere firmly to the strawboard constituting the body of the blank.

E indicates the longitudinal scoring appliance, the same being seen not only in Figs. 2 and 4, but also in Figs. 13 and 14.

F F F F represent the duplicated mechanism for imparting the transverse scores and angular edgewise cutting or mitering to the blank, and G represents the mechanism for transversely severing the one prepared blank from that portion of the strip next behind it, the completed blank at the time of severing having been forwardly fed in relation to the former and box-making devices to be subject to the action thereof.

In Figs. 2 and 2^a are illustrated rolls t t^2 , upper and lower, geared together, between which the strip from which the blank is produced passes for the purpose of deflecting the edgewise portion of the blank comprised in the stay-sections 41, so that they have a suit-

able degree of angularity to the portions of the strip constituting the side sections of the box, and whereby when the side sections are wrapped around the former J, hereinafter described, the stay-sections 41 will be inclined inwardly under or relatively to the bottom of the former in the manner shown in Fig. 18, so that when the former, after having been swung from its horizontal position into its vertical position and is moved down against the impact-bed, the said stay-sections inclined as mentioned, will be squeezed against the bottom of the box, which has been brought to place next to the bottom of the former. The upper roll is formed with a bevel at its end, as shown at t' , while the other roll is constructed with the end flange, which is in the form of a frustum of a cone, as seen at t^3 , the space at t^4 between these inclined circular faces of the roll being angular to the axes and peripheries of the rolls.

bb represent the feed-rollers for positively imparting swiftly and periodically the forward feeding movements to the material to bring them subject to the aforementioned mechanisms, to be thereby acted upon.

H represents a main shaft suitably driven by pulley or pulleys H^2 through means of belt 46, said shaft, through gearing 47, driving the cam-shaft 48, on which several cams of the different motions are mounted. One of these cams 49 is primary to the stock-feeding mechanism and coacts with the cam-lever 50, to which there is also applied the retracting-spring 52. Said cam-lever has the long slot 51. This cam-lever has adjustably secured thereto, at a higher or lower point suitably distant from its center of swinging movement by the shouldered stud 51^a and a binding-nut 51^b, the thrust-rod 53, which plays through the oscillating shoe mounted on the end of the stud-shaft 55, which shaft has loosely thereon the pinion and pawl-carrier 56 and 57, the rack-teeth 58 of the thrust-rod meshing with the pinion, while the pawl 59 takes into the teeth of the ratchet-wheel 60, which, through its hub 62, is united to the comparatively-large sprocket-wheel 63, around which runs the sprocket-chain 64, said sprocket-chain also running around the sprocket-wheel 65, affixed to the lower feed-roll b . The swinging movement forwardly of the cam-lever 50, as positively caused by the cam 49 through the rack-and-pinion portions of the device 56 58, imparts a swinging of the pawl-carrier and a partial rotary motion of the ratchet-wheel and also of the therewith-connected sprocket-wheel, resulting in a multiplied rotary motion to the sprocket-wheel 65 and a movement of the strip equal to the length of one complete blank, this length of feed being regulated by the adjustment of the thrust-rod nearer or farther from the center of the swinging movement of the cam-lever.

In practice the motion of the feed-rollers bb , imparted as explained, is quite rapid and forcible, and therefore the strip is fed for

wardly with a consumption of comparatively-small space of time and with such vigor as to have it subjected to the preparing operations aforementioned as imparted by its being drawn through the various rollers and scorers.

The longitudinal scorer E comprises upper and lower plates or bars 66 and 67, Figs. 13 and 14, the lower one being comprised as the transverse member of a stand to be supported on the opposite side rails or members 68 of the horizontal frame. The adjacent faces of the plates 66 and 67 are formed with the steps, as indicated at 69, and the two parts are so supported relatively to each other as to leave the space 70 approximately equal to the thickness of the blank between them, having the offset, as shown. The upper member has the two slots 72 therein and also at its one end the rib 73. The shanks of the screws 74 pass loosely through the slots and with a screw engagement into tapped holes therefor in the lower bar or plate 67. The yoke or clamp 75 is by the binding-screw 76 confined on the lower horizontal member 67 of the longitudinal scorer and straddles over the top of the upper plate 66 and constitutes a guide or guard for the strip being fed toward the box-making mechanism.

In order that the two parts of the scorer may be adjusted toward and from each other, so that the space between the two parts at the steps 69 69 may conform to the thickness of the stock being used, the adjusting-screw 77 screws through the lug 78 of the stationary member against the end of the bar 66.

The transverse scorers F, Figs. 7 to 11, are in substance dies comprising an immovable lower part and an upper part which is movable toward and away from the lower part, the said parts which come into proximity being comprised by hardened-steel plates or bars 79 and 80. The base of the scoring attachment F comprises the transverse bar 82, which forms the part of a casting having the depending clamp-lugs 83 83 to engage the support-bars 68 at the opposite sides of the machine-frame and the upstanding integral cheek-pieces 84 84 and also formed with the depression-seat 85 for the opposite upstanding cheeks 86, which are held in place by screws and which constitute journal supports and guides. Each of these castings is so engaged with the side bars of the frame that they may be adjusted bodily and confined in various relations to each other, so that the scoring and mitering of the blanks may be comparatively close together for small boxes or much farther apart for larger boxes, and in conjunction with the clamp-lug 83 there is provided the clamp-plate 87 and confining-bolt 88, and through the opposite lug 83 is the set-screw 90.

92 represents a carrier-bar for the creasing-die member 79, the same being vertically adjustably secured thereon by the screws 93, which pass through the slot 94 in the plate

with a screw engagement into the body of the support-bar. The support-bar has the overhanging ledge 95, through which thread the screws 97 97, the lower ends of which bear on the upper edge of the plate 79. By loosening the set-screws 93 and turning down the screws 97 the part 79 may be bodily adjusted to present its edge lower and in closer proximity to the step-shaped immovable die-plate 80, as may be required for comparatively-thin stock.

The springs 103, interposed between the ends of the carrier-bar 92 and of the lower immovable bar 82, normally maintain the upper movable die member clear and separated from the lower die member, with which it coacts.

Between the upper ends of the paired cheeks 84 86 are pivotally mounted the levers 104 and 105, each having at its lower end a roller 111, located adjacent to and in due time to bear on the top of the carrier-bar 92, moving the same forcibly downward against the stress of the retracting-springs 103.

The lever 105 has the operating-arm 106, with which is connected the link 107, which is also secured to the crank member or lever-arm 108, affixed on the shaft 109, said shaft receiving a rocking reciprocatory movement through the connection with the lever-arm 110, affixed thereto, of the thrust-rod 112, receiving periodically its motion from the rotary cam 113, Fig. 6.

The links 114 connect the two oppositely-arranged levers 104 105 for each of the sets of scoring and mitering devices F, so that when swinging motion is imparted to the one 105 through the leverage action of its arm 106 to bear downwardly the one end of the carrier 92 the opposite end of such bar will be similarly downwardly forced.

Although the downward movements of the carriers for all of the scorers F are imparted by the one rocking movement of the rock-shaft 109, these movements are respectively in succession, one being slightly before another, for the reason that it is desirable that the paper may give or yield in its length to compensate for the step-shaped transverse crease imparted thereto and to avoid the necessity of the paper having to stretch between the cross-scorings or of being severed, as might ensue with the paper held simultaneously at different points and simultaneously creased or scored. It will therefore be pointed out, as indicated in Fig. 7, that the inclination of the link-connected levers 104 105 for one of the scorers is normally at a slightly-different angle from that of the next pair of corresponding levers, so that the downward movement imparted to one arm 106 will cause the adjoining or connected levers 104 105 to be brought into their straightened or vertical positions, acting in the manner of one member of a toggle before the forcing-levers for the next scorer come into action on the carrier-bar of the latter. The lower bar 82 has therein a triangular hole corresponding to the

V end of die-plate 80, and each upper carrier-bar has a triangular mitering-die 99, secured by a set-screw. (See Figs. 7, 9, and 10.)

The blank or strip which has been scored and mitered and being fed forwardly into position relative to and subject to the action of the box-forming mechanism has the front edge portions 41 41 thereof gummed on the upper side by being passed between the feed-rollers *bb*, operated as hereinbefore described, the former having peripherally running on its end portion 115 the gum-carrying roller 117, which takes gum as supplied thereto from the roll 118, which runs partly immersed in the gum-box 119, suitably supported in such a way as to constitute no obstacle or impediment to the operations of the parts and the passage of the strip.

The mechanism for severing the blank transversely on the line 31 31, Fig. 2^b, corresponding to the rear edge of the side stay-section 34, (indicated at *G*,) resembles in many respects the scoring attachment comprising a transverse bar or base 82^a, having depending lugs and clamping devices like those 83, before described, and also having the upstanding cheeks, between which is the blade or shear-bar 120, operated by the link-connected inclined levers 104^a 105^a, through the rocking of the shaft 109, springs 103^a being applied for retracting or elevating the shear-bar in good time after its descent for the positive transverse severing has been accomplished.

The portion 123 of the strip next to the rear of the severing-line 31 31 and which is comprised in the foremost side section of a given blank receives a transverse layer of gum of a width equal to the width of the side stay-section 34, this being advantageously performed simultaneously with the severing of the next blank in advance from the one to be so gummed, and to this end there is attached to the upstanding cheeks, within which the shear-bar is movable, a standard or arch bearing 124 for the stem 125 of the gummer 126, coacting with which latter when it is in its elevated position is the gum-carrying roll 127, mounted on the swinging reciprocatory support 128, having its movement imparted thereto by the connection with the lever-arm 129 thereof of the link-rod 130, (shown in Fig. 12,) which is connected to the lever 129, to which motion is imparted for operating the gummer 126, hereinafter shortly to be described. This gumming motion, whereby the gum-carrying roll is caused to take the gum received thereupon from the roller 133, which runs in contact with the roller 134 in the gum-box 135, comprises in itself no novelty, being very common in envelop-making machines.

The gummer 126 is caused to move downwardly in unison with the shear or severing bar 120 by having connection therewith from the aforesaid rock-shaft 109, the same consisting in the rock-shaft 136, provided with the lever-arm 137, linked to the gummer-stem 125, said rock-shaft, furthermore, having the

lever-arm 138, to which is connected the rod or link 139, which is secured to the lever-arm 140, radially extended from said rock-shaft 109.

The forward portion of the strip as scored or creased, mitered, gummed, and severed comprised in the blank for making the sides of the box is brought into position in relation to the box-forming mechanism, as shown in Figs. 3 and 6, such mechanism being located in the line of feed beyond the blank forming and severing mechanisms described, and said box-forming mechanism will be now described.

J represents the former, of rectangular shape and of size corresponding to the given box to be made, the same having a height greater than the width of the blank.

c represents the bottom of the former, the same in Figs. 1, 3, 5, and 6 being shown as in its first position—that is, swung on its rocking support *d*—so that its bottom *c* is located in a vertical plane and its rear side *e* in a horizontal plane.

*e*² represents the front face of the former, *f* the end thereof nearer the blank making and feeding mechanism, and *f*² the end which is the farther therefrom. Below the axis of rocking movement of the former coincident with the journal-supports *d* is the impact-bed *K*, which is rigid and stationary, being bolted or otherwise constructed as a part of the framing of the machine.

The former is mounted on the former-carrier *L*, at the opposite ends of which are the journal extensions or gudgeons *d*², suitable boxes to constitute the aforementioned journal-bearings being provided.

The suitably-timed intermittent rocking reciprocatory motion is imparted to the former-carrier by means of the cam and thrust-rod motion, illustrated as comprising the lever-arm 142 on the extended journal at one end of the former-carrier, to which the link 143 is connected, said link, furthermore, being connected with the intermediately-pivoted lever 144, to which is also connected the link or connecting-rod 145, the lower end of which has connection with the cam-lever 146, coacting with which against the cam-roll 146^a is the cam 147 on the cam-shaft 48.

The former *J* is sustained spring-supported on the former-carrier through means of the two bars or suitably-massive rods 150, extending perpendicularly in parallelism above or beyond the top of the former through holes 152 therefor in the former-carrier, the projecting upper ends of these bars being surrounded by the spiral supporting-springs 153, interposed between the shoulders 154 at the upper ends of said bars and the upper side of the former-carrier.

The location of the axis of rocking motion of the part *L* above the impact-bed is such that when said part *L* and the former are given in unison their quarter-revolution or quadrantal movement the bottom *c* of the former will assume a position slightly above

the top of the impact-bed, the downward movement of the former against the impact-bed as further given thereto independently of and relatively to the former-carrier and against the supporting stress of the spring 153 for setting the bottom being hereinafter described and explained in conjunction with the means employed to that end.

The former is shown as detachably rigidly supported on the aforesaid bars 150, so that a former proper of another size may be quickly and easily substituted for rendering it possible in conjunction with other adjustments to make boxes of different sizes, and therefore it will be perceived with sufficient clearness, on reference to Figs. 1 and 15, that the said bars 150, instead of being directly formed as a part of or affixed to the former proper, are formed as rigid extensions of the block or plate 155, having a rib and seat engagement with the top of the former proper, being firmly and strongly connected thereto by the bolt 156. For simplicity of description and brevity, however, the former will be herein referred to as if provided directly with and directly carried by the said bars 150, and the upper part of the former is equipped with a pair of perforations or parallel sockets 157, ranging in transverse lines perpendicular to its sides $e e^2$, through which are passed the bars or substantial support-rods $g g$, the intermediate portions of the latter lying and having axial play within the sockets 157 therefor. The outer ends of the said bars g , protruding forwardly of or beyond the front face of the former, are shouldered, as indicated at 158, between which shoulders and the part of the former through which the bars play are interposed spiral springs 159 under compression. At the extremities of the said bars g , which protrude at the opposite side of the former supported thereon rigidly and in a plane perpendicular to the length of said bars, is the gripper-support or gripper-carrier M, the plane in which the same is extended being adjacent and parallel with the rear side e of the former. This gripper-carrier M comprises sections 160, ranging opposite each other and located adjacent the ends of the former, and it is upon the inner edges of these sections 160 that the supplemental grippers $h h$ have peculiar loosely-pivoted supports. When the former is in its upswung position shown in Fig. 6 for the reception under the then horizontal rear side e of the side-forming blank x between such side e and the grippers thereunder, the grippers are slightly but sufficiently distant from the former, so as to constitute no obstacle to the disposition stated of the blank, and this bodily removal of the grippers when the former is in the upswung position is accomplished by the shouldered opposite end of the gripper-carrying rods having come to abutment against the fixture or beam 162, whereby there is relatively a forcing action by the beam endwise on the rods g against the reaction of their springs. Each

supplemental gripper h is comprised in a comparatively-thin though stiff and rigid plate or member having a support by the pin 163 and slot 164 on the inner edge of the gripper-carrier section 162, the same at its outer end having the curved or angularly-extended gripper-finger 165, adapted to be brought against the end c of the former at the edge thereof adjoining the rear side e . The gripper device h at its opposite end is formed with the angular member or lever-arm 166. The spring 167, mounted on the section 160 of the gripper-support adjacent the front end of the gripper device h , exerts an endwise forcing action on the said gripper, so that it is normally maintained with the end of the slot against the abutment screw or pin 163. The said gripper device h is formed with the offset 168 near its gripping-finger 165, and a stop or limiting pin 169 extends from the inner edge of the aforesaid supporting-section 160, so that the gripper may have no undue swinging motion in the direction toward the former.

It is to be understood that while the former is in the position (upswung) shown in Fig. 6 to receive thereunder the long blank x the separate blank y to constitute the bottom is fed down to overlie the then vertical bottom c of the former by what is known as a "shovel-feed" motion from a tier or supply y^2 of these blanks suitably supported at the forward upper part of the machine. (See Figs. 6, 24, 25, and 26.)

The mechanism for feeding the bottom-blanks y comprises a horizontal base-support 275, upstanding at the rear of which is the vertical wall or plate 276, the latter having its forward face about coincident with the bottom c of the former when the latter is swung bodily into the horizontal position shown in Fig. 6, and this front face of the wall or plate 276 is slightly rearwardly beyond the edge of the horizontal support 275, on which the bottom-blanks edgewise rest, leaving the space 271, down through which the blanks y may be shoved one at a time. The bottom support 275 has the adjustable section 277, operated forwardly and rearwardly by the adjusting-screw 278, so that the unobstructed space 271 may be about as wide or slightly wider than one blank y , but less than the width of two of the blanks, so that but one at a time may be forced down.

279 279 represent opposite cheek-plates adjacent which the ends of the blanks have their dispositions and by which the blanks are guided.

280 represents the follower, for which 282 is the spring for exerting a rearward-forcing pressure on the follower to maintain the tier y^2 of blanks with the rearmost one always against the inner face of the plate 276.

The plate 276 is centrally apertured, as seen at 283, having therein guideways 284 for the vertically-reciprocatory carrier 285 for the comparatively-thin blade or pusher-bar 286,

the arrangement of which is in the plane of the aforesaid opening 271.

The reciprocatory motion of the carrier 285 and the pusher-blade is imparted by the connection through the link 287 of the lever 288 on the rock-shaft 289, which shaft is also provided with the lever-arm 290, to which the thrust-rod 292 is connected, said thrust-rod being primarily actuated by rotary cam, such thrust-rod being connected with the cam-operated lever-arm 106^a, which actuates the severing device G. The blanks *x* and *y* having been brought to the position in relation to the former as indicated, (it being better understood on reference to Fig. 1^a, Sheet 1, and Fig. 16, Sheet 7, which views, however, show later stages of the operations, and on reference to the view of the blank, Fig. 2^b, that the forward side section 32 of the box-blank *x* and the next end section 33 to the rear thereof, reckoned in the direction of the line of feed, are extended and lie to the leftward beyond the then horizontal and lowermost rear side of the former and that the second side section 32, which forms the rear side of the box, lies directly next to and under the rear side of the former, while the last or rearmost end section 33 and the side stay-section 34 remain extending to the rightward of the end of the former which is toward the blank making and feeding mechanism,) the former has now imparted thereto its downward rearward quadrantal movement into the position near the impact-bed K. (Shown in Fig. 15.) This movement of the former removes the bars *g g* away from their abutments against fixture or bar 162, leaving the springs 159 free to react to carry the gripper-support and gripper members 160 closely toward the rear side of the former near its bottom and the supplemental grippers *h h* to protrude crosswise of and to bear against the bottom of the former, confining both blanks *x* and *y*, so that such blanks will be positively and without liability of displacement carried by and in close adherence to the former. This movement being between opposite upstanding cheek-like appliances N and O, quite closely adjacent the inner faces of which the ends of the former pass, a folding action ensues, whereby the portions of the blank *x* protruding beyond both ends of the former are caused to be turned at right angles to the section 32 of the blank which lies against the rear side of the former, and thus the end sections 33 33 are turned at right angles to the back section and brought closely against the former ends, while the other section 32, which forms the front of the box, (and which when fed was farthest to the left,) and the side stay-section at the rear (or most rightward end of the blank) now occupy positions protruding forwardly beyond the vertical front face of the former.

The upstanding appliances N and O are stated as opposite, although being arranged adjacent the planes of the ends of the former.

The one O is considerably forward of the one N, so that when the former is in its pendulous position only a small rearward step-formed portion of appliance O overlaps the end of the adjacent end of the former, while the other face 202 of the step-formed rear end is never projected rearwardly beyond the front face of the former. The front-side section of the box is next turned about simultaneously with the turning of the side stay-section 34 at right angles from its forwardly-protruding position against the front side of the now vertical former by the front-section turner Q, which is substantially a swinging arm mounted on a vertical rocking shaft or spindle 187 adjacent the corner of the former.

The spindle or rock-shaft 187 is journaled in the adjustable block or support 188, (see Figs. 15 and 23,) and the properly-timed rocking reciprocatory movement is imparted to the rocking shaft as follows: Said shaft has thereon the lever-arm 189, which is provided with a pin or stud 190, which has an engagement in the slot 192 of the lug or fixed extension 193 of the sliding bar or thrust-rod 194, Figs. 3 and 5, with which the rod 195 has a forcing and drawing connection, said rod being operated by a cam 195^a on the cam-shaft in the most common manner and as extensively employed in other motions in this machine.

The cheek or upstanding plate N, the inner face of which is parallel with the end of the former, has its position immovable (unless adjustably changed for a different-sized box) and quite close to the proximate end of the former and serves as the blank-turner at that end of the former; but the opposite upstanding or cheek-like part (represented by the general letter O) is formed in sections arranged for a movement, while always maintained in a plane parallel with the other end of the former, bodily diagonally rearwardly and inwardly toward such end of the former and back again forwardly and outwardly therefrom. The same, in addition to constituting the turning device for the right-hand end section to cause the latter to be brought against the end of the former, also comprises means and capabilities for inwardly deflecting or turning the side stay-section 34 toward the front face of the former to be overlapped by the extremity of the farthest side section of the blank having the gum applied thereon, as indicated at 123 in Figs. 2^b and 16, and for setting said parts of the blank, and in this connection reference is to be had to Figs. 1, 3, 6, 15, 21, 21^a, and 22. The said device O comprises two plates *i* and *j*, the same being constructed with the horizontal groove 197 and rib 198, whereby the part *j* has a horizontal sliding movement on the inner face of the part *i*, the parts being held facewise together by the pin or pins 199, engaged with part *j* and projecting therefrom through the slots 200 in part *i*. As shown in the drawings, the end 202 of the plate *j* is normally

slightly in advance of the rear end of plate *i*. The plate *i* is the carrier-plate for the plate *j*, the latter having a horizontal movement facewise thereon for adjustment as effected by the adjusting-screw j^2 , threading through a lug in plate *i* against the forward end of plate *j*. The said plate *i* is formed at its forward end bifurcated or with a recess extending within its middle portion from such end, whereby the upper and lower portions 201 are produced, which straddle the bracket or adjustable fixture 206, which is supported on the transverse supporting beam or bar 202. The said adjustable fixture 206 has upstanding and depending portions 207, provided with the cam-surfaces 208, while the ends of the parts 201 of plate *i* have also inclined members or cams 209 to coact with the inclines or cams 208. The plate *i* may therefore move endwise rearwardly and at the same time horizontally crosswise of the plane of its face. Also beyond the rear edge of the plate *i* is an upstanding plate or cheek *k*, at the forward edge portion of which are the cams or inclined members 210. The said plate *i* has mounted within a suitably-apertured central portion thereof a roller 212, adjacent which is a cam 213, mounted on the rock-shaft 214, suitably journaled in an adjustable bearing and receiving its rocking motion through the connection with its lever-arm 215 of the cam-actuated thrust-rod 216, the cam 217 and cam-lever 218, with which the thrust-rod is connected, being shown in Fig. 3. At the proper instant in the box-making operation said cam 217 on the cam-shaft 48, through the connections described, operates the aforesaid cam 213 to impart the rearwardly-crowding action to the said plate *i*, and with it said plate *j*, which rearward movement of said plate by the action of the cams or inclines 208, 209, and 210 causes as the end of the plate *j* approaches the plane of the side of the former also the crosswise bodily movement of both plates, whereby the rear edge of the plate *j* comes within the corner of the former and finally with a hard bearing thereagainst. Noting Fig. 1^a, it will be understood that before the parts *i* and *j* have been rearwardly moved in any substantial degree the side stay-section 34 projects forwardly coincident with the plane of the end of the former, and it will be perceived that the plate *i* has at its rear end portion on its face opposite the plate *i* the device *m*, which is the side-stay-section deflector or turner, the same being comprised in a flat spring secured at its forward end to the face of said plate *j* and having normally a curvature rearwardly on an inclination from said face terminating in the extremity m^2 , which inclines angularly toward said face of the plate *j*, and within such face is a depression 220, within which the spring device *m* may enter. Now as the appliances O are moved rearwardly and also crosswise toward the end of the former the inclined extremity m^2 of the spring stay-section-turning

device turns the stay-section toward the front of the former, so as to be overlapped by and carried against the former by the gummed extremity of the side section 34 as brought around by the side-section turner Q, and the final rearward motion, whereby the step-shaped end of the appliance O comes against the portion of the side section which overlaps the stay-section, causes the adhesion and setting of these parts. The cam 217, having quickly passed from its operative engagement with the cam-lever 218, Fig. 3, permits the appliances O to be forwardly withdrawn to their normal positions by the retracting-spring 222. The former, on the bottom of which the bottom-blank has been brought to place and around the sides of which the side-forming blank has been wrapped and set as described, has now its motion independently of the former-carrier L downwardly against the impact-bed K by reason of the downward movement imparted to the pressure-bar R, which is in substance the top transverse member of a frame the vertical members of which are constituted by the vertical rods or bars 225, which play through holes therefor in the impact-bed and are united transversely at their lower ends below said bed by the horizontal plate or tie-bar 226. Journaled at 228 in the tie-bar is a cam-lever 227, the portion of this part above the pivotal point being formed with a cam-slot 229, within which a cam-roll 230 has engagement, said roll being hung on a depending lug 232 of the impact-bed. The swinging motion of the cam-slotted lever is imparted by the connection therewith of the thrust-rod 233, which also has connection with the cam-lever 234, the cam-roll at the free end of which engages in the cam-groove 236 of the rotary cam 237 on the cam-shaft 48. (See Fig. 5.) As the former approaches the limit of its downturned position the lever members 166 of the grippers *h* come into proximity to and over the abutment members 185 185, standing above the impact-bed K, at a suitably rear portion of the latter, so that when the former is given its down movement independently of its carrier L against the bed K through means to be shortly described the grippers *h* by the contact of their members 166 against said projections 185 have a rearward-swinging movement from engagement at the lower corner of the plunger, as seen in Fig. 19, to one of disengagement, as seen in Fig. 20, and such swinging movement of the grippers is accompanied also by an endwise bodily movement thereof against their springs 167, as permitted by their slots 164, so that they give to or yield upwardly from the impact-bed and form no impediment to the former having the straight down movement thereagainst. The drawing down of the former against the impact-bed causes the bottom stay-sections 41 to be set against and stuck to the marginal portions of the bottom-blank, whereupon the pressure-bar R, as one with the frame, is elevated

to its normal position slightly above the impact-bed, and the former is now free to be returned to its horizontal forwardly-extended position, as insured by the former operating motion already described, simultaneously with which the box is stripped or shed therefrom. The means to this end consists in a plunger-rod 240, which plays through openings therefor in the former-carrier L and top-supporting part 155 of the former and having its extremity, on which is the sufficiently-widened flat head or enlargement 242, located within the hollow former, normally near the bottom thereof. The plunger-rod has secured thereto the chain or other flexible connection 243, which has a turn around a guide-sheave 244 on the former-carrier, thence extending to connection with the one arm of the intermediately-pivoted lever 245, to the other end of which the thrust-rod 246 is secured, the cam 247 for operating this rod being shown in Fig. 6, and this motion is so timed that the plunger has its endwise thrust to force the box off from the former at the proper interval in the operation of the mechanism.

241 is a retracting-spring for the stripper plunger-rod 240.

The machine may comprise means for automatically supplying in proper relations to the box-making mechanism, which has been described, a second blank *w* for constituting an outer bottom, the same being stuck to the stay-sections 41 and inclosing same between such outer bottom *w* and the inner bottom *y*, and reference is now to be had to Figs. 27, 28, and 12.

At the side of the machine opposite that at which the sides-blank *x* is fed to and under the former, but in a lower position, are a pair of feed-rolls 302 302, through which a strip of strawboard or like stock from the continuous-supply roll is intermittently horizontally fed toward and to a position under the inverted former, the strip passing beneath an aperture or opening 303 therefor between the under edge of side-turner cheek N and the impact-bed K.

A mechanism is indicated at T for imparting intermittently the rotational feed motion to the rolls 302, the same being actuated by a cam 304 on the aforesaid cam-shaft 48.

The part N has the socketed guide-clips or rigid strips 300, in which the members 305 of an appliance comprising a shear-blade 306 are vertically guided, 307 representing an elevating retracting-spring for the severing appliance.

The forward end portion of the strip to constitute the outer bottom-blank having been introduced under the former between its bottom and the impact-bed, the descent of the bar R to depress the former against the bed K also be direct abutment against the top of the shearing part, also forcibly depresses the latter, causing its blade to coact with the recessed portion 308 of the bed, one straight-

edged marginal corner of which constitutes the other shear member.

The stay-sections 41 41 of the box-sides blank *x* when double or inner and outer bottoms *y* and *w* are to be comprised in the completed box are not only gummed on the upper side, as described, by the action of gum-roll 115, but are also gummed on their under side. (See dotted-line representation of the additional gumming devices in Fig. 12.) The final squeeze imparted between the bottom of the former and the bed K sets the stay-sections 41 and both bottoms *y* and *x* thereto.

This machine having been thus far described with but slight reference to its capabilities constituted by many of the appliances being adjustable, whereby boxes of different sizes may be made, I will now point out the adjustable and interchangeable parts and arrangements to this end.

Should it be desired to make a box of a different size, of course a different-sized former J would have to be interchanged for the one shown. The machine would next have to be adjusted and adapted for the feeding of a different portion of the length of the strip from which the blank *x* is made. This would be accomplished by changing the point of connection at 51^a of the thrust-rod 53 with the cam-operated lever 50. In order to have the lines of scoring properly in relation to each other to correspond to the newly-mounted former and blank *x* to be brought in relation thereto, the scoring devices are unfastened from their connections with the rails or side members 68 of the framing and slid toward or from each other, as required, and again secured. If the blank be wider or narrower, the guide-clamps 75 are adjusted transversely of the machine on the longitudinal-scoring attachment. Again, if the width of the bottom stay-section 41 is to be considerably varied an interchangeable longitudinal-scoring device suitably corresponding is brought into place in substitution of the one previously used, this being most readily accomplished by the bolts 71, which form the detachable confining means for the longitudinal-scoring device, the same passing through the foot-lugs 71^a of said device into the aforesaid member 68. The severing device G also has a suitable range of bodily-adjustable movement nearer to or farther from the approximate end of the former. If a larger or smaller former is substituted, the open worktable or blank-support S (shown in Figs. 3, 6, and 16) is adjusted so that the horizontal forwardly and rearwardly ranging members or bars 250 thereof may be as close together as admissible, yet leaving sufficient space between them unobstructed for the quadrantal movements of the former. The horizontal bar 252, which is bolted to opposite members of the frame A of the machine at a point well in advance of the course of movement of the former, has the slots 253 therein, ranging at

right angles to the length of said separated members 250, the bolts 254 passing adjustably through the slots 253 and through perforations therefor in the extremities of the members 250.

An adjustable stop is provided at the extreme leftward end of the machine to limit the strip, so that when fed forward it will not be run beyond its proper disposition relatively to the former.

The gripper-carrier M, comprising the main carrier-section 161 and the sections 160, arranged and supported in separation on the part 160^b, have adjustable bolt-and-slot engagements, as shown at 160^a, Figs. 17 and 18, whereby the sections 160, on which the grippers are directly mounted, may be more nearly approached or farther distended, so that the grippers will have their suitable cooperative relations to the former within the ends of the latter, and to accord with the positions to which the grippers are adjusted the gripper-releasing lugs or projections 185 are adjustable toward or from each other on the impact-bed K, the latter having the T-slot 255 ranging parallel with the rear side of the former, the inverted head of the T-bolt 256 protruding upwardly through the foot-section or base 257 of the part or appliance 185, receiving at its upper end the locking-nut 258.

The upper end portions of the gripper-releasing abutments are further constituted by the adjustable sections 259, whereby the latter may be slightly raised or lowered on their supporting-uprights, so that the releasing of the grippers may be nicely timed for the most advantageous results. The cheek-like appliances constituting the blank-turners may be also adjusted toward or from each other, and also the appliance O may be adjusted in a line parallel with the end of the former.

It will be perceived that the connection of the cam-operated lever-arm 215 on cam-shaft 214 is by a spline-groove and set-screw, Fig. 15, so that the shaft may be adjusted endwise without affecting its disposition in relation to the means for imparting its rocking motion.

The adjustment of the part N is accomplished by having in its base N² the slot 260, through which the bolt 262, Fig. 3, passes with a thread engagement into the horizontal supporting part of the frame or impact-bed on which the upstanding device N is supported.

The bracket 205, on which the appliance O is supported, is adjustable forwardly and rearwardly and also transversely relatively to the line of swinging movement of the plunger, as is also the cam-supporting part k.

While it is my intention to claim as broadly as possible and permissible in view of the state of the art all box-making mechanisms of a novel character embodying the principles and subject-matter of this invention, and while, furthermore, considerable invention is involved in the rendering of many of the ap-

pliances having the cooperative relations described adjustable and such adjustability will also be herein claimed, provisions for the adjustments may manifestly be specifically different from those here shown and pointed out, and hence limitation to the particular means or formations of parts whereby the adjustments are possible is not to be presumed.

I may in lieu of having a shovel-feed for feeding the bottom from the blanks vertically to position opposite the end of the former omit this mechanism and employ the feed mechanism substantially such as shown in Fig. 27, making boxes with an outside bottom only, or I may employ the mechanism substantially as shown in Fig. 27, locating it in the place of the shovel-feed above the former, and produce the bottom-blanks successively from a continuous supply-strip from which they are severed.

It will be manifest that the only waste of paper stock or board resulting from the use of this machine is comprised in that removed from the strip in mitering the same.

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

1. Means for scoring sheets or blanks of paper-stock longitudinally, in combination with a plurality of transverse-scoring dies, one member of each of which is movable toward or from the other, means for imparting a feeding movement of the stock through and subject to the action of the longitudinal-scoring means, and bringing it between the several transverse-scoring dies, and means for forcing the several movable die members toward their companion members, each at different instants, and means for separating said die members.

2. The combination with a device for scoring sheets or blanks of paper-stock longitudinally by imparting a step-like crease without removal of the stock consisting of separated stationary die-walls having the space between them stepped, substantially as described, of means for drawing the sheet through the said stepped space between said die-surfaces.

3. The combination with a support for a supply-roll of paper-stock, and a device for scoring the paper longitudinally by imparting a step-like crease thereto without removal of the stock, which consists of separated stationary die-walls having the space between them of step form, substantially as described, of means for drawing the paper through said stepped space of the longitudinal-scoring device.

4. The combination with a device for scoring a sheet or strip of paper longitudinally consisting of separated stationary die-walls having a stepped opening therebetween, of feed-rolls in advance of the longitudinal-scoring device, means for imparting intermittent rotational feeding movements to said rolls, and devices for regulating the extent of the successive rotations of the feed-rolls.

5. A longitudinal-scoring device for sheets or blanks of paper-stock consisting of separated stationary die-walls having a stepped opening therebetween, in combination with means for feeding a sheet forwardly through the scoring device, means for feeding forward a covering or finishing sheet together therewith, and for applying an adhesive to the surface of one of the sheets, and means for pressing said sheets together as they travel forwardly, substantially as described.

6. The combination with a support for a supply-roll of paper-stock and a support for a supply-roll of surface-finishing sheet material, of means for supplying an adhesive to the surface of one of said sheets, feed-rolls for drawing the said sheets together forwardly in unison, a device for overturning the edge-wise portions of the finishing-sheet over the marginal portion of the body-sheet, and means interposed between the overturning device and the feed-rolls for pressing the overturned portions of the covering material against the bottom sheet.

7. The combination with supports for the supply-roll of strawboard or other like paper-stock, and for a supply-roll of a covering and surface-finishing paper, of a paste-roll over which one of the sheets runs in surface contact, pressure-rolls between which the two sheets pass, an overturning device comprising a plate with convergent overturning-lips 44, 44, the second set of presser-rolls in advance of the overturning device, feed-rolls in advance of the latter, and means for imparting rolling movements thereto.

8. The combination with supports for the supply-roll, of strawboard or other like paper-stock and for a supply-roll, of a covering and surface-finishing paper, of paste-roll over which one of the sheets runs in surface contact, pressure-rolls between which the two sheets pass, an overturning device comprising a plate with convergent overturning-lips 44, 44, the second set of pressure-rolls in advance of the overturning device and feed-rolls in advance of the latter and means for imparting rolling movements thereto, and a longitudinal scorer between the feed-rolls, and second set of pressure-rolls, for the purposes set forth.

9. The combination with supports for the supply-roll, of strawboard or other like paper-stock and for a supply-roll, of a covering and surface-finishing paper, of paste-roll over which one of the sheets runs in surface contact, pressure-rolls between which the two sheets pass, an overturning device comprising a plate with convergent overturning-lips 44, 44, the second set of pressure-rolls in advance of the overturning device and feed-rolls in advance of the latter, means for imparting rolling movements thereto, and a device between the feed-rolls and the forward pair of pressure-rolls for bending the marginal portion of the covered strip angularly to the main portion thereof.

10. The combination with the feed-rolls *bb* and means for imparting intermittent rotational movements thereto, of a supply-roll for the stock from which the blanks are produced, mechanism for marginally mitering the blank, a device through which the blank is drawn by the feed-rolls operating to bend the marginal portions of the blank angularly, and mechanism for severing the blanks.

11. In a blank-making machine, the combination with supports for supply-rolls of paper-stock and covering material, surface-pasting device and sticking device, an overturning and setting device for the covering marginally on the body-stock, means for scoring the blank longitudinally, means for bending the marginal longitudinal portion of the blank angularly, and transverse-scoring and mitering devices, means for feeding the stock forwardly intermittently, and means for operating the transverse-scoring devices successively, substantially as described.

12. In a scoring mechanism, the combination with lower bars or members provided with step-shaped scoring-dies, of upper scoring-dies and carriers therefor, an intermittently-operating paper-feed mechanism and means for moving several upper-die members toward the lower scoring-die at respectively succeeding instants, and means for retracting said dies, for the purposes set forth.

13. In a box-blank-making mechanism, the combination with upper and lower die members, one movable toward and from the other, and both provided with corresponding step-shaped creasing or scoring surfaces, and both also provided with male and female mitering-dies, of means for imparting motion of the one member toward and away from the other.

14. The combination with a series of combined transverse-scoring and mitering dies adjustably mounted to have their dispositions in parallel lines the one nearer to or farther from the other, as desired, and means for operating them successively, of feed-rolls for the paper strip, means for intermittently imparting rotational movements to said rolls and devices for regulating the extent of the feeding rotational movements thereof.

15. In a box-making mechanism, two or more sets of die members for operating on the blank each having one of the die members movable toward and from the other, paired normally-inclined link-connected levers for each movable die member, a rock-shaft 109, and means for imparting a rocking motion thereto, lever-arms provided on said rock-shaft and links connecting the rock-shaft lever-arms with one of each of the paired levers for the movable die members.

16. In a box-blank-making mechanism, two or more sets of die members for operating on the blank, each having one of the die members movable toward and from the other, and having combined therewith paired normally-inclined link-connected levers, for each movable die member, each set of die members and

their levers being bodily adjustable for various relative dispositions, a rock-shaft 109, and means for imparting a rocking motion thereto, lever-arms provided adjustably lengthwise on said rock-shaft, and links connecting the rock-shaft lever-arms with one of each of the said levers for the movable die members.

17. In a box-blank-making mechanism, two or more sets of die members for operating on the blank, each having one of the die members thereof movable toward and from the other, and having combined therewith paired normally-inclined link-connected levers, a rock-shaft 109, lever-arms thereon, and links connecting the rock-shaft lever-arm with one of the levers of each pair of the movable die members, a rotary shaft, a cam thereon, a thrust-rod actuated by the cam, and a lever on the rock-shaft with which the thrust-rod is connected, substantially as described.

18. In a box-blank-making mechanism in combination, two or more sets of die members for operating on the blank, and a pair or set of severing-dies, each set having one of the members thereof movable toward and from the other, and having separating-springs, and having combined therewith paired normally-inclined link-connected levers for each movable die member, a rock-shaft 109, means for imparting rocking motion thereto, lever-arms provided on said rock-shaft, links connecting the rock-shaft lever-arms with one of each of the paired levers for the movable die members, and intermittently-operating feed-rolls for the paper strip.

19. In a box-blank-making mechanism, two or more sets of die members for operating on the blank, and a pair of severing-dies, each set having one of the members thereof movable toward and from the other, and having combined therewith, paired normally-inclined link-connected levers, for each movable die member, each set of die members and their levers being bodily adjustable for various relative dispositions, a rock-shaft 109, and means for imparting a rocking motion thereto, lever-arms provided adjustably lengthwise on said rock-shaft, and links connecting the rock-shaft lever-arms with one of each of the pairs of levers for the movable die members.

20. The combination with a framing or support comprising the parallel bars 68, 68, of a transverse support-bar 82 having detachable confining means for fastening the support-bar 82 adjustably on said parallel frame-bars, and provided with the paired separated upstanding cheeks 84, 86, at its opposite ends, a carrier-bar 92 having its ends movably guided between said upstanding cheeks and having the scoring or creasing step-shaped die member 79, a corresponding step-shaped die member 80 provided on said bar 82, springs 103 applied for elevating said carrier-bar 92, the levers 104, 105, intermediately pivotally mounted in the upper portions of said upstanding cheeks, and having the rollers 111

at their extremities, the link 114 connecting said levers, an arm 106 provided on one of said levers, and means for imparting intermittently a swinging motion to said arm 106.

21. The combination with a framing or support, of a transverse support-bar 82 mounted on said framing, and provided with the paired separated upstanding cheeks 84, 86, at its opposite ends, a carrier-bar 92, having its ends movably guided between said upstanding cheeks provided with the overhanging ledge 95, and having the scoring or creasing step-shaped die member 79 separately formed and arranged at the side of the bar 92, the adjusting-screws 97 passed through said ledge against the edge of the member 79, set-screws 93 for confining the said member in adjustment, a step-shaped die member 80 provided on said bar 82, springs 103 applied for elevating said carrier-bar 92, the normally-inclined levers 104, 105, intermediately pivotally mounted in the upper portions of said upstanding cheeks, and having the rollers 111 at their extremities, the link 114 connecting said levers, an arm 106 provided on one of said levers, and means for imparting intermittently a swinging motion to said arm 106.

22. The combination with a framing or support, of a transverse support-bar 82 mounted on said framing, and provided with the paired separated upstanding cheeks 84, 86, at its opposite ends, a carrier-bar 92, having its ends movably guided between said upstanding cheeks provided with the overhanging ledge 95, and having the scoring or creasing step-shaped die member 79, separately provided and arranged at the side of the bar 92, the adjusting-screws 97 passed through said ledge against the edge of the member 79, set-screws 93 for confining the said member in adjustment, a step-shaped die member 80 provided on said bar 82, springs 103 applied for elevating said carrier-bar 92, and means for imparting a forcing motion to the carrier 92.

23. The combination with a framing or support, of a transverse support-bar 82 mounted on said framing, and provided with the triangular female die-opening 98, and with the paired separated upstanding cheeks 84, 86 at its opposite ends, a carrier-bar 92, having its ends movably guided between said upstanding cheeks provided with the overhanging ledge 95, also with the male triangular die member 99, and having the scoring or creasing step-shaped die member 79, separately provided and arranged at the side of the bar 92, the adjusting-screws 97 passed through said ledge against the edge of the member 79, set-screws 93 for confining the said member in adjustment, a step-shaped die member 80 provided on said bar 82, springs 103 applied for elevating said carrier-bar 92, and means for imparting a forcing motion to the carrier 92.

24. In a mechanism for feeding a continuous supply-strip of paper-stock to the action of blank-making mechanism, the combination

with a pair of feed-rolls, of a lever, means for imparting rocking reciprocatory motion thereto, a thrust-rod connected to said lever and a shaft having a ratchet-wheel loose thereon, and a pinion and united pawl-carrier fast thereon with which pinion a rack-provided portion of the thrust-rod engages, a pawl mounted on the pawl-carrier and engaging the ratchet-wheel, and means of driving connection between the ratchet-wheel and one of the feed-rolls, substantially as described.

25. In a mechanism for feeding a continuous supply-strip of paper-stock, the combination with a pair of feed-rolls, of a lever having the slot 51, means for imparting thereto an intermittent swinging reciprocatory movement, a sprocket-wheel affixed to one of the feed-rolls, another sprocket-wheel around which and the first sprocket, the sprocket-chain passes, a thrust-rod having adjustably the connection nearer or farther the center of swinging movement with said lever, a pinion rotatably mounted and rack-teeth provided on said thrust-rod, a wheel as one with the sprocket-wheel, and a pawl or forcing member as one with the pinion, arranged whereby the thrust movements of the said rod impart a step-by-step movement to the sprocket-chain.

30 26. In a mechanism for feeding a continuous supply-strip of paper-stock to the action of blank-making mechanism, the combination with a pair of feed-rolls, of a lever, means for imparting rocking reciprocatory motion thereto, a thrust-rod connected to said lever and a shaft having a ratchet-wheel loose thereon, and a pinion and a united pawl carrier fast thereon with which pinion a rack-provided portion of the thrust-rod engages, a pawl mounted on the pawl-carrier, and engaging the ratchet-wheel, sprocket-wheels secured to the ratchet-wheel and to one of the feed-rolls, and a sprocket-chain running around said sprocket-wheel, substantially as described.

45 27. In a box-making machine, the combination with appliances for covering strawboard or like material with a finishing sheet material, mechanism for producing a blank from such covered material, constituting the sides of the box, of box-making mechanism, and mechanism for feeding separate box-bottom blanks in conjunction with the box-side blanks to the box-making mechanism.

55 28. The combination with means for intermittently feeding a strip of paper or like material from a continuous supply, of mechanism for scoring and mitering the strip and severing it to constitute a blank for the box sides, box-making mechanism to the action of which the blank is brought by said feeding means, comprising a former, and side-section-turning appliances, whereby the blank is caused to be automatically wrapped around the former.

65 29. In a machine for making a paper box from suitably-gummed blanks having a side

stay-section and several bottom stay-sections deflected, as described, and separate bottom-blank, the other for constituting the bottom, the combination with a former, and means for bringing the box-side blank in relation to a side of the former, means for bringing a bottom-constituting section in relation to the bottom of the former, means for wrapping the first blank around the former and overlapping and setting its one end upon the side stay-section which is provided at the other end of said blank, and pressure mechanism for setting the bottom stay-sections and bottom-blank firmly together.

30. In a paper-box machine, means for feeding forward, scoring and mitering a strip of paper-board, means for applying gum to the uniting or stay sections of the strip, combined with a former and means for wrapping the blank around the former and setting the side stay-section, mechanism for placing a separate bottom-blank adjacent the former, and means for uniting the bottom stay-sections of the first-named strip to the bottom-blank, substantially as described.

31. In a paper-box machine, an impact-bed, and a former having a quadrantal movement relatively thereto, means for imparting to the former its quadrantal movement, and means for imparting thereto also a bodily forcing movement against said impact-bed, opposite parts between which the former has its quadrantal movement, serving as opposite side-section turners, one of said side-section turners, a front-side-section turner being bodily movable toward the front face of the inverted former for pressing and uniting the front-side section and the side stay-section, and means for imparting such movement thereto.

32. In a paper-box machine, an impact-bed, and a former having a quadrantal movement relatively thereto, means for imparting to the former its quadrantal movement, and means for imparting thereto also an independent bodily forcing movement against said impact-bed, opposite parts between which the former has its quadrantal movement, serving as opposite side-section turners, a front-side-section turner, and means for seasonably operating it, one of said side-section turners being bodily movable toward the front face of the inverted former for pressing and uniting the front-side section and the side stay-section which have overlapped relations, together, and means for imparting such movement thereto.

33. In a paper-box machine, means for feeding forward, scoring and mitering, a strip of paper-board, means for applying gum to the uniting-sections of the strip, combined with a former, and an impact-bed relatively to which it moves, means for wrapping the blank around the former and setting the side stay-section, mechanism for placing a separate bottom-blank adjacent the former, and means for imparting a bodily motion of the former against

the impact-bed to unite the bottom stay-sections of the first-named strip to the bottom-blank.

34. The mechanism for automatically making a surface covered or finished box which consists in the combination of supports for supply-strips of body-board and surface-finishing sheet material, means for carrying the forward portions of said sheets forwardly, means for applying an adhesive to the surface of one of said sheets, means for pressing the sheets together, devices for longitudinally and transversely scoring the said covered sheets, and for mitering the same marginally, means for angularly deflecting the portion of the blank which comprises the stay-sections, means for applying an adhesive to the end portion of the blank, a former in relation to which the blank is fed, means for bending the blank around the former to have its end portions overlap, means for squeezing such overlapped portions, means for feeding a separate bottom-blank to bring it with its margins next to the deflected bottom stay-sections of the first blank, and mechanism for applying a squeezing pressure to said adjoining portions of the bottom-blank and stay-sections.

35. The combination in a box-making machine of mechanism for feeding transversely and longitudinally scoring, mitering and severing from a continuous supply-strip to constitute a blank having at one end a side stay-section and at its edge bottom stay-sections, a deflecting device for the bottom stay-sections, means for gumming the end portion of the blank, means for gumming the bottom stay-sections, box-making mechanism comprising a former, relatively to a side of which the blank is brought, means for causing the blank to be wrapped around the former and overlapped and set at the stay-section, means for feeding a bottom-blank with proximity to the bottom of the former, and provisions whereby a squeezing pressure is brought upon the bottom-blanks and bottom stay-sections at the bottom of the former.

36. In a machine for making a paper box from a blank having a side stay-section and several bottom-sections, and a bottom-blank, the combination with means for applying an adhesive to an end portion of the first blank, and means for applying gum to one of said blanks whereby the stay-sections and bottom-blank will be caused to adhere, of box-making mechanism comprising a former, in relation to the bottom of which the bottom-blank is to be brought, and means cooperating with the former for wrapping the first blank around the former sides with one end brought to overlapped relations to the side stay-section, a presser mechanism operating against the former for setting said overlapped portions and means for insuring a pressure on the bottom-blank toward the bottom of the former, substantially as described.

37. The combination in a box-making ma-

chine of mechanism for feeding transversely and longitudinally scoring, mitering and severing from a continuous supply-strip to constitute a blank having at one end a side stay-section and at its edge bottom stay-sections, a deflecting device for the bottom stay-sections, means for gumming an end portion of the blank, means for gumming the bottom stay-sections, box-making mechanism comprising a former, relatively to a side of which the blank is brought and means for causing the blank to be wrapped around the former and overlapped and set at the stay-section.

38. In a paper-box machine, the combination with a former, mounted for a rocking motion, one or more automatically-closing grippers for holding the blank by an intermediate portion thereof against the former, opposite parts between and relatively to which the said former and blank gripped thereto are movable whereby by the abutment of projecting end portions of the blank against said parts, such portions of the blank are turned toward the opposite ends of the former and means for imparting rocking reciprocatory motions intermittently to the said former.

39. In a paper-box machine, the combination with a former, mounted for a rocking motion, one or more automatically-closing grippers for holding the blank by an intermediate portion thereof against the former, opposite parts between and relatively to which the said former and blank gripped thereto are movable whereby by the abutment of projecting end portions of the blank against said parts, such portions of the blank are turned toward the opposite ends of the former, means for imparting rocking reciprocatory motions intermittently to the said former and means for causing when the former is withdrawn from between the said opposite parts a separation of the grippers from the former.

40. In a paper-box machine, the combination with a former, mounted for a rocking motion, one or more automatically-closing grippers for holding the blank by an intermediate portion thereof against the former, opposite parts between and relatively to which the said former and blank gripped thereto are movable whereby by the abutment of projecting end portions of the blank against said parts, such portions of the blank are turned toward the opposite ends of the former, means for imparting rocking reciprocatory motions intermittently to the said former, and means for causing at about the time the former reaches the limit of its movement within the said parts, the automatic separation of the grippers from engagement with the former.

41. In a paper-box machine, the combination with a former, mounted for a rocking motion, one or more automatically-closing grippers for holding the blank by an intermediate portion thereof against the former, opposite parts between and relatively to which the said former and blank gripped thereto are movable whereby by the abutment of project-

ing end portions of the blank against said parts, such portions of the blank are turned toward the opposite ends of the former, means for imparting rocking reciprocatory motions intermittently to the said former, means for causing when the former is withdrawn from between the said opposite parts a separation of the grippers from the former, and means for causing at about the time the former reaches the limit of its movement with said parts the automatic separation of the grippers from engagement with the former.

42. In a paper-box machine, the combination with a former, mounted for rocking motion, one or more automatically-closing grippers for holding the blank by an intermediate portion thereof against the side of the former, opposite parts between and relatively to which the said former and blank gripped thereto are movable, for the purpose set forth, means for imparting rocking reciprocatory motions intermittently to the said former, a side-stay-section turner movably mounted and cooperating with the former and means for actuating it.

43. In a paper-box machine, the combination with a former, mounted for rocking motion, one or more automatically-closing grippers for holding the blank by an intermediate portion thereof against the side of the former, opposite parts between and relatively to which the said former and the blank gripped thereto are movable, one thereof being movably mounted comprising a side-stay-section deflector, means for imparting the rocking reciprocatory movements to the former, and means for imparting to the movable one of said opposite parts its movement to render operative the side-stay-section deflector.

44. In a paper-box machine, the combination with a former, mounted for a rocking motion, one or more automatically-closing grippers for holding the blank by an intermediate portion thereof against the side of the former, opposite parts between and relatively to which the said former and blank gripped thereto are movable, for the purpose set forth, means for imparting rocking reciprocatory motions intermittently to the said former, a side-stay-section turner movably mounted on one of said opposite parts, means for imparting to the one of said opposite parts, on which the stay-section turner is mounted a movement both rearwardly and inwardly toward the former, to insure the operation of the stay-section turner, and a pressure by the rear end of the so-movable part against the front of the former adjacent its corner, for the purposes set forth.

45. In a paper-box machine, the combination with the former, of a gripper mounted to move bodily in unison with the former and adapted to have a gripping and releasing movement toward and from the side of the former, and means independent of the former for imparting such movements thereto, supplemental grippers mounted on the primary

grippers adapted to have gripping and releasing movements toward and from the bottom end of the former, and means for imparting their movements thereto.

46. In a paper-box machine, the combination with the former, mounted and movable as described, and means for so moving it, of a gripper-carrier primarily supported on the former, and having one or more gripper members 160 movable toward and from the rear side of the former, one or more supplemental grippers mounted on the members 160 having members adapted for a gripping motion at the bottom of the former near its rear edge, means for releasing the primary grippers, and with them the supplemental grippers on the upswinging of the former, means for also releasing the supplemental grippers on the final movement of the former, relatively to the impact-bed.

47. The combination with the former, mounted and movable as described, an abutment relatively to which it moves, means for imparting its movement, a gripper-carrying rod *g* supported on, and movable transversely relatively to the former, provided with a gripper member movable toward the side of the former, a spring for causing normally the closing of the gripper to the former, said rod being arranged to contact against said abutment on the upswinging of the former to force the gripper open.

48. The combination with the former movable as described, and the impact-bed relatively to which the former has a swinging movement, and an independent approaching-and-receding movement, means for imparting such movements to the former, a gripper member 160 mounted and movable as described on and relatively to the side of the former and having mounted thereon for a swinging movement and a bodily-sliding movement, the supplemental gripper *h*, provided with the angular member 165 adapted for a gripping action at the bottom of the former, for the purposes set forth.

49. The combination with the former movable as described, and the impact-bed relatively to which the former has a swinging movement, and an independent approaching-and-receding movement, means for imparting such movements to the former, a gripper member 160 mounted and movable as described on and relatively to the side of the former and having mounted thereon for a swinging movement and a bodily-sliding movement, the supplemental gripper *h*, provided with the angular member 165 adapted for a gripping action at the bottom of the former, and a part relatively to which the gripper device *h* is brought on the closing of the former and impact-bed, one toward the other for securing the swinging of the said device *h* whereby its angular member is moved from its position crosswise of the bottom of the former.

50. The combination with the former, and

gripper 160 mounted and movable as described, and means for imparting their movements thereto, of the supplemental gripper *h* mounted for a swinging motion on the gripper 160, and having the member 165, and an abutment 185 with which the supplemental gripper has a coöperative action for its release, and a spring exerting a closing force on the said supplemental gripper *h*.

51. In a paper-box machine, the combination with the former, and main gripper member 160, of the supplemental gripper *h* having slot 164, gripper-finger 165 and lever member 166, the pivot-pin 163, the spring 167 and the gripper-releasing abutment 185.

52. In a paper-box machine, the combination with the former mounted for a quadrantal movement as described, and means for so moving it, of the abutment 162 above the former, the rods *g g* playing transversely through the former carrying at their lower ends the gripper members 160, 160, and having their oppositely-extended ends shouldered, between which and the former are gripper-closing springs, and means for imparting the aforesaid movement to the former.

53. In a paper-box machine, the combination with the former mounted for a quadrantal movement as described, and means for so moving it, of the abutment 162 above the former, the rods *g g* playing transversely through the former carrying at their lower ends the gripper members 160, 160, and having their oppositely-extended ends shouldered, between which and the former are gripper-closing springs, means for imparting the aforesaid movement to the former, and a mechanism for feeding a blank under the side of the former, leaving its ends projecting beyond the former ends.

54. In a paper-box machine, the combination with a former, of a gripper mounted to have a gripping and releasing movement toward and from the side of the former, means for imparting such movements thereto, supplemental grippers mounted on the primary grippers adapted to have gripping and releasing movements toward and from the bottom end of the former, and means for imparting their movements thereto, mechanism for automatically feeding long box-side blanks between the side of the former and the primary grippers, and means for feeding box-bottom blanks between the supplemental grippers and the bottom of the former.

55. In a paper-box machine, the combination with the former movable as described, and means for so moving it, of the device *O* having a step-shaped rear end, a cam for moving it rearwardly, cam-surfaces against which it impinges whereby in its rearward movement it also moves facewise, substantially as described.

56. In a paper-box machine, the combination with the former movable as described, of a part rearwardly diagonally toward the corner of the former, whereby its end comes

to a pressure bearing on the front face of the former adjacent its corner, means for so moving it, a side-stay-section turner yieldingly mounted on the extremity of the said movable part, and adapted to recede within the plane of the side face of such part, substantially as and for the purposes set forth.

57. In a paper-box machine, the combination with the former movable as described, of a part rearwardly diagonally toward the corner of the former, whereby its end comes to a pressure bearing on the front face of the former adjacent its corner, means for so moving it, a side-stay-section turner yieldingly mounted on the extremity of the said movable part, and adapted to recede within the plane of the side face of such part, and the front-section turner and means for operating it.

58. In a paper-box machine of the character described, the side-turning and stay-section-setting device *O* comprising the plate *i* and the plate *j* arranged facewise thereon with its rear end forward of the rear end of the plate *i* and having a slot and set-screw adjustable engagement therewith, and the adjusting-screw *j*² threading through a part provided therefor on said plate *i*, and exerting a forcing action endwise against the plate *j*, substantially as described.

59. The combination with the former having the motions described, and means for imparting the motions thereto, opposite side-turners for the blank facewise past which the former has its swinging motion and a front side-section turner mounted for a swinging motion toward the former and a withdrawal therefrom and means for imparting such motion thereto.

60. In a paper-box machine, the front-side-section turner *Q* comprising a bar or arm, a spindle or shaft on which it is carried, mounted for a rocking motion and having the lever-arm 189, a slide-bar 194 provided with the angular extension 193 provided with a slot through which a stud which is carried by the lever-arm 189 engages, and a cam-actuated thrust-rod 195 for imparting an endwise-reciprocatory motion to said bar 194, substantially as described.

61. In a paper-box machine, the combination with the former, having the motions, and means for imparting same, substantially as described, of the device *O* comprising the stay-section turner and the stay-section-setting part, and the swinging reciprocatory front-side-section turner *Q*, and means for imparting a back-and-forth swinging motion toward and away from the front of the former.

62. In a paper-box machine, the combination with an impact-bed, opposite separated side-turning devices, a former, a support on which it is mounted for a rocking motion to and between said side-turners, and into proximity to the impact-bed, and for a withdrawal therefrom, means for imparting the rocking movement to the former, and means for se-

curing as regards the former and impact-bed, a motion for squeezing action of the one in relation to the other.

63. In a paper-box machine, a former-carrier, mounted for a rotational movement, and means for imparting such movement at intervals thereto, a former mounted to swing bodily in relation to the former-carrier, and having an independent movement in relation to the carrier-springs for supporting the former on its carrier, an impact-bed and relatively to which the former is swung and means for forcing the former relatively to its carrier against the impact-bed.

64. In a paper-box machine, the combination with the impact-bed K, of a former-carrier mounted for a rocking movement above the former and having former-supporting bars or rods 150 playing through transverse sockets therein, and supporting the former, springs for sustaining the former and its supporting rods yieldingly on the former-carrier, means for imparting a rocking movement to said carrier, a horizontal vertically-movable bar under which the former is swung, and means for exerting a downward forcing movement to said bar for carrying the former against the impact-bed, substantially as described.

65. The combination with the former, the former-carrier on which the former is spring-supported, and means for imparting a rocking movement intermittently to the former-carrier, of the transverse bar R beneath which the former is swung, the impact-bed over which the former is swung, the rods 225 to which said bar R is connected, and the tie-bar or member 226, the cam-lever 227 pivotally mounted in the tie-bar, and provided with the cam-slot 229, the cam-engaging member 230 supported by the impact-bed, and means for imparting a swinging movement to said cam-lever 227, substantially as and for the purposes set forth.

66. In a box-making mechanism of the character substantially as described comprising a former J and means for imparting its movements thereto and blank turning and setting mechanism cooperating with the former, of a plunger playing through the former and adapted after the completion of the box by an endwise-thrust movement against the box-bottom to strip the box from the former, and means for imparting such thrust and a withdrawal thereafter to the plunger.

67. The combination with the former having a rocking movement, and means for imparting such movement thereto, of a plunger movably guided and extending within the former and carried bodily thereby, a sheave 244 movable in unison with the former, a lever 245, a flexible connection 243 secured to said lever and extending therefrom guided around said sheave to a connection with the plunger, means for imparting a swinging motion to said lever and a retracting-spring for the plunger.

68. In a box-making machine of the character described, the combination with the impact-bed, a vertically-movable horizontal bar R thereabove, the former-carrier L above said bar, and supports therefor in which it is adapted to have rocking movements, means for imparting intermittently-rocking reciprocatory movements thereto, of the former J, the former-supporting rods 150 playing transversely through the former-carrier, and the supporting-springs 153 therefor, the rods *g g* carried bodily by and playing transversely relatively to the former at right angles to said former-supporting rods 150 and carrying grippers disposed adjacent the rear side of the former and the gripper-closing springs 159, the stationary abutment-bar 162 against which said rods *g* have endwise-forcing bearing when the former is swung into its horizontal position, and cam-actuated means operative to force said bar R downwardly when the former is swung thereunder, substantially as and for the purposes set forth.

69. In a box-making machine, the combination with the former having the rocking movement, and means for imparting such movement thereto, substantially as described, and grippers coacting with the side and bottom of the former, and means for automatically operating them, of means for feeding a long blank comprising box-side sections, side stay-sections, and bottom stay-sections under the lower side of the upswung former, and means for feeding a bottom-blank in a plane at right angles to the side-constituting blank into place adjacent the bottom of the former.

70. In a paper-box machine, the combination with a former mounted for a rotational movement, and grippers opening and closing from and toward one side of the former, and the bottom thereof, and means for seasonably operating them, mechanism for feeding the blank longer than the former along one side of the former, means for feeding bottom-blanks next to the bottom of the former, and further means for feeding further bottom-blanks to superimpose the first bottom-blank and the bottom stay-sections which are provided on the long blank, and side and stay section turners for the said long blank.

71. In a paper-box machine, the combination with the former J mounted to have a rocking reciprocatory swinging movement whereby intermittently it is caused to assume a position with its bottom in a vertical plane, and thereafter a position with its bottom in a horizontal plane, means for feeding a box-sides blank under the horizontally-disposed side of the former, a support for a tier of bottom-blanks located above the former and means for pushing such bottom-blanks in the successive operations of the machine one at a time downwardly across the vertically-disposed end of the former.

72. In a paper-box machine, the combination with a former mounted to have intermittently-reciprocatory swinging movements

and means for imparting such movements substantially as described, of means for feeding a box-sides blank along one side of the former, and means for feeding strip material in a continuous supply in relation to the bottom of the former, and a cutter for severing the portion to constitute the bottom-blank from the continuous-supply strip.

73. The combination with the former J and the impact-bed, relatively to which the former has a quadrantal swinging movement to bring the bottom of the former adjacent and parallel to the impact-bed, feed-rolls for feeding a strip from a continuous supply to present the forward end portion thereof between the bottom of the former and the impact-bed means for imparting intermittently-feeding rotation to said rolls and mechanism for severing the portion of the strip fed beneath the former from the continuous supply to the rear thereof, substantially as described.

74. The combination with the former mounted as described, and means for imparting intermittently its movements thereto, of feeding mechanism for moving a long box-sides blank adjacent a side of the former, means for feeding a box-bottom blank adjacent the end of the former, means for applying adhesive to both sides of the first-named blank, gripper devices coacting with the former for confining the said blanks to the side and bottom thereof, the impact-bed relatively to which the former and gripped blanks are moved, the stationary side-section-turning device N relatively to which the former is movable, and to which it is brought with its one end in proximity facewise thereto, mechanism for feeding strip material from a continuous supply beneath said part N and therebeyond to position under the former, means for severing the so-disposed portion of the strip from the continuous supply, means for releasing the grippers and means for causing the closing of the former and impact-bed, the one toward the other, for the purposes set forth.

75. In a box-making machine of the character described, the combination with the impact-bed K and the side-section-turning upstanding plate N, of the former and a rocking carrier on which it is mounted for a swinging movement bodily therewith and for an independent movement toward the impact-bed, mechanism for feeding strip material from a continuous supply beneath said plate N and therebeyond to position under the former, a severing-blade mounted for a reciprocatory

movement on said part N, the bar R ranging above the top of the former and arranged for a forcing downward movement against said severing-blade, and means for imparting the descending movement to said bar for depressing both the former and the blade and a part constituting the shear member below said blade and with which it coacts, and retracting means for the blade.

76. In a paper-box machine, the combination with means for feeding, for scoring, and for mitering a blank, of paste or gum rolls between which an edge portion of the blank is fed, and means for supplying an adhesive peripherally on both said rolls.

77. In a paper-box machine, the combination with the former J mounted for a rocking motion intermittently, and means for periodically giving it its rocking movement whereby it is sustained with its bottom in a vertical plane and thereafter swung downwardly to a position at right angles thereto, of the bottom-blank-feed mechanism comprising the blank-support 277, the upstanding plate near one end of said support with a recess vertically for the passage of blanks at the end of said plate downwardly, side check members 279, a spring-pressed follower 280, a reciprocating blade or pusher 286 and means for imparting thereto its reciprocatory motion.

78. In a paper-box machine, the combination with the former J mounted for intermittent swinging movements and means for periodically imparting the same thereto, whereby the former at one interval has a position with its bottom in a vertical plane and is thereafter swung downwardly to a position at right angles thereto, of the bottom-blank-feed mechanism comprising the blank-support 275, the upstanding plate 276, provided with the guideways 284, and so arranged relatively to the adjacent end of the said blank-support 275 as to leave an aperture 271 for the vertical passage therethrough of the blank successively, the supplemental section 277 adjustably mounted on the support 275 and adapted to have its extremity projecting more or less across said aperture, side guides for the blanks, a follower for the blanks, a carrier 285 movable in said guideways 284 having the blade or bar 286 and means for imparting a vertical reciprocatory motion to said carrier, substantially as described.

CHAUNCEY W. GAY.

Witnesses:

ALFRED BIRNIE,
WM. S. BELLWS.