(No Model.) 8 Sheets--Sheet 1.

E. E. CLAUSSEN.

PAPER BAG MACHINE.

No. 598,497. Patented Feb. 8, 1898.

Fig. 1.

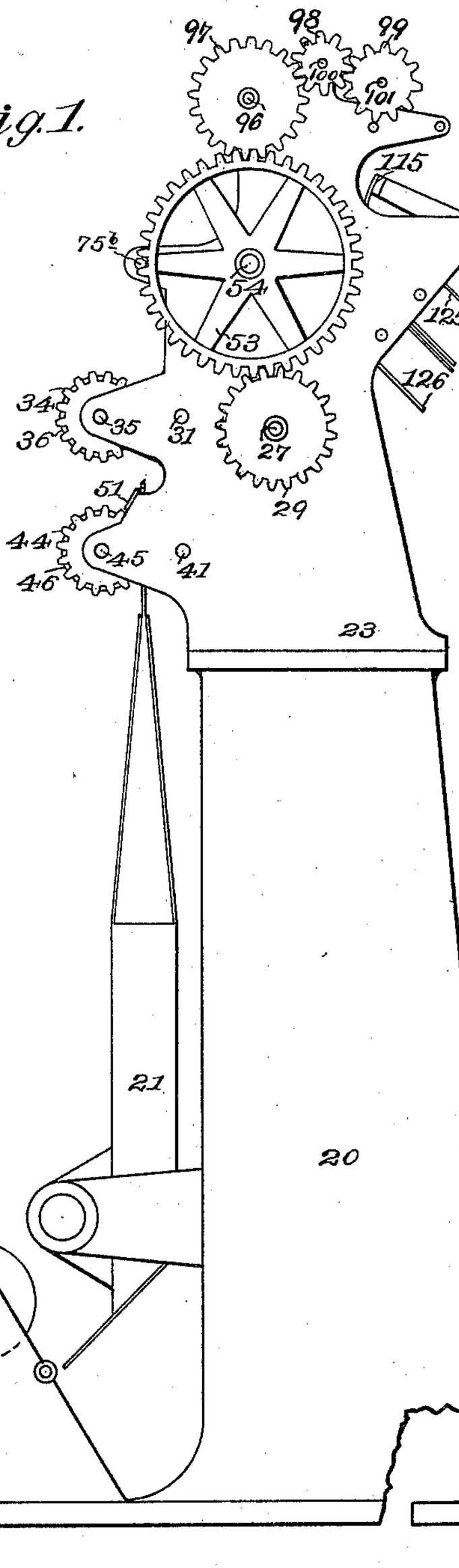
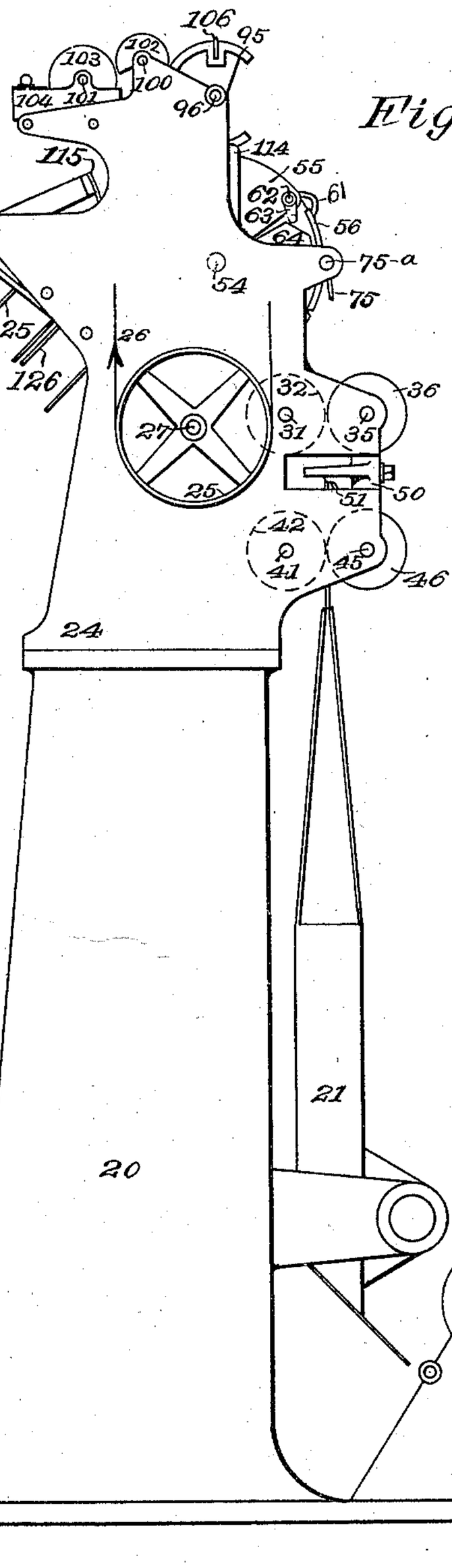


Fig. 2.



Witnesses:
Janette S. Ellsworth
Isaac A Allen Jr

Inventor:
Edward E. Claussen.

(No Model.)

8 Sheets—Sheet 2.

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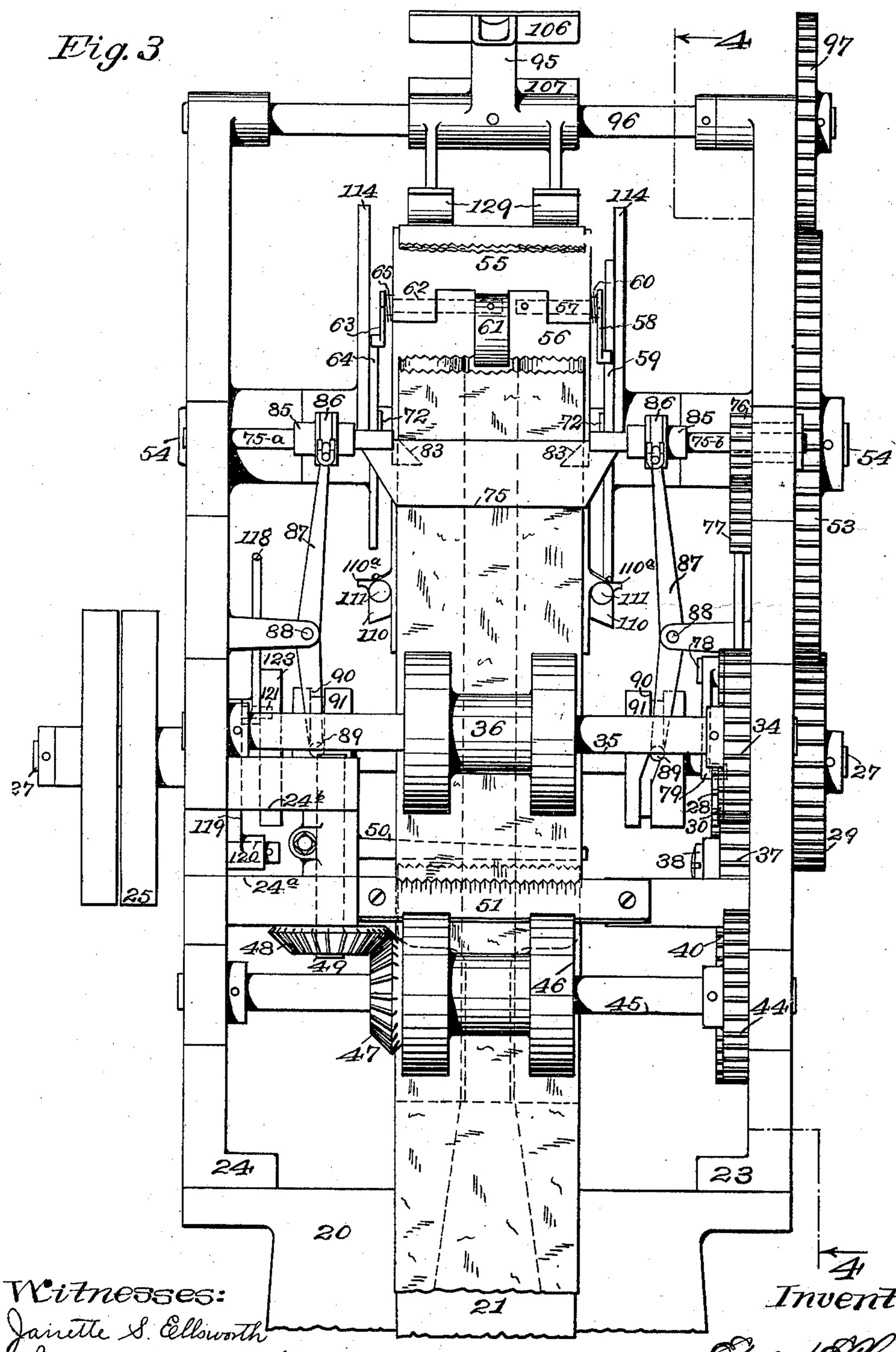
No. 598,497. Patented Feb. 8, 1898.

Fig. 3



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8 Sheets—Sheet 3.

E. E. CLAUSSEN.

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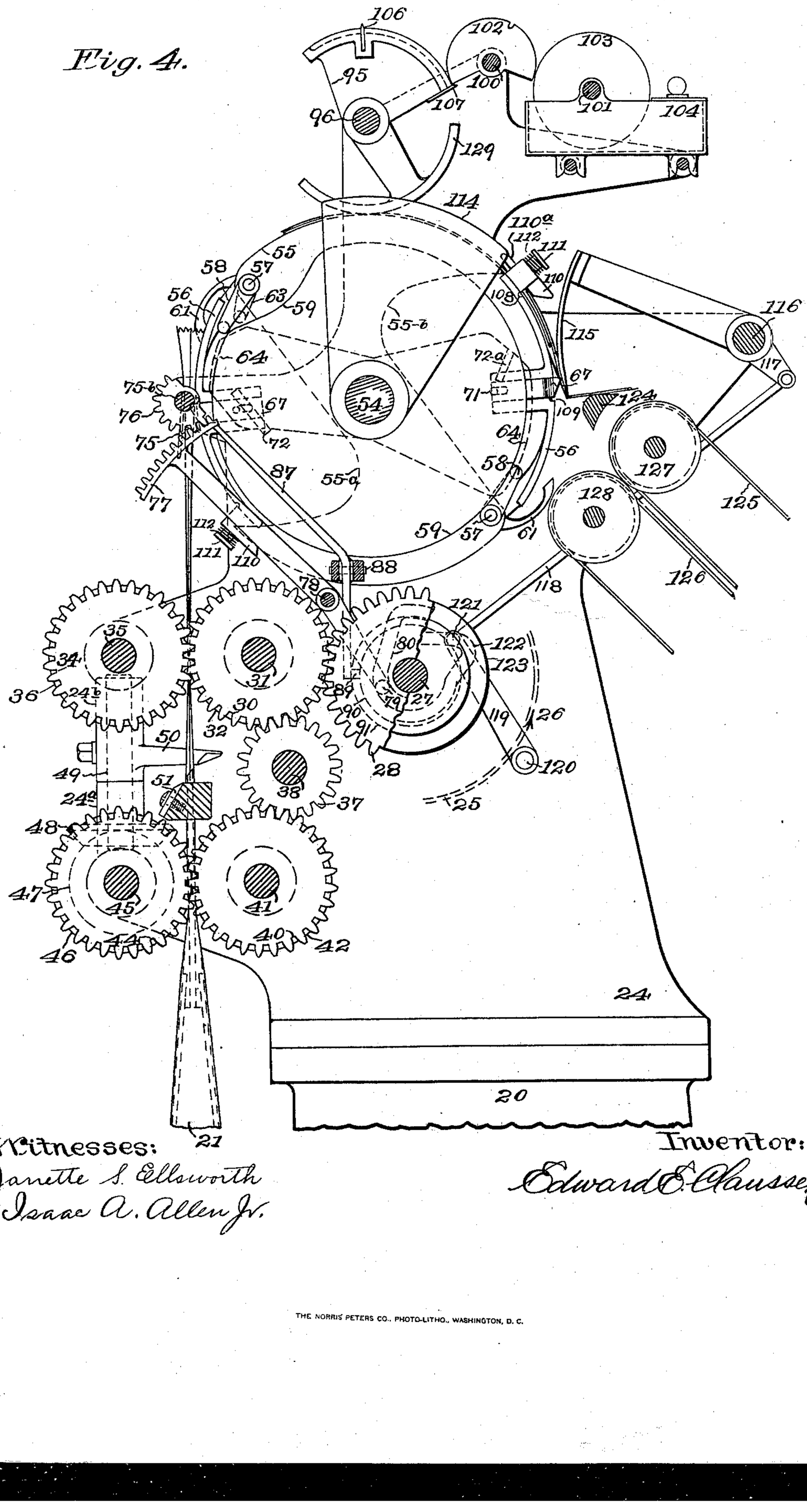
Fig. 4.



Witnesses:
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Inventor:
Edward E. Claussen.

(No Model.)

8 Sheets—Sheet 4.

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Fig. 5

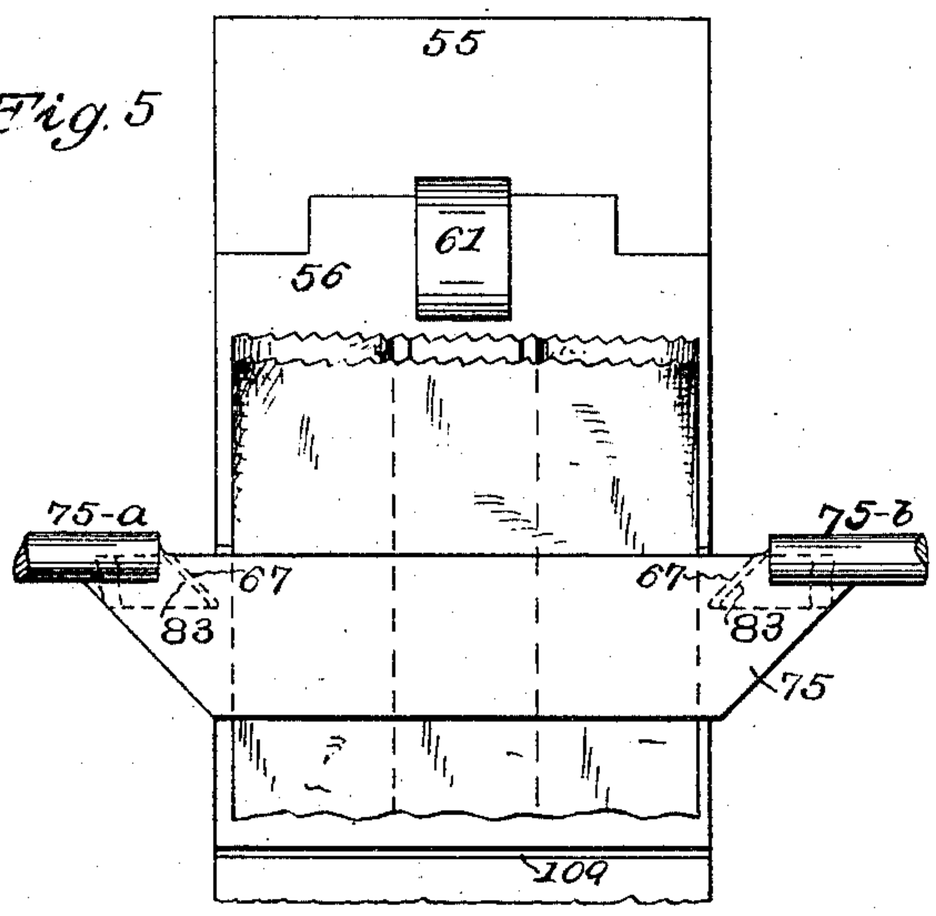

Fig. 6

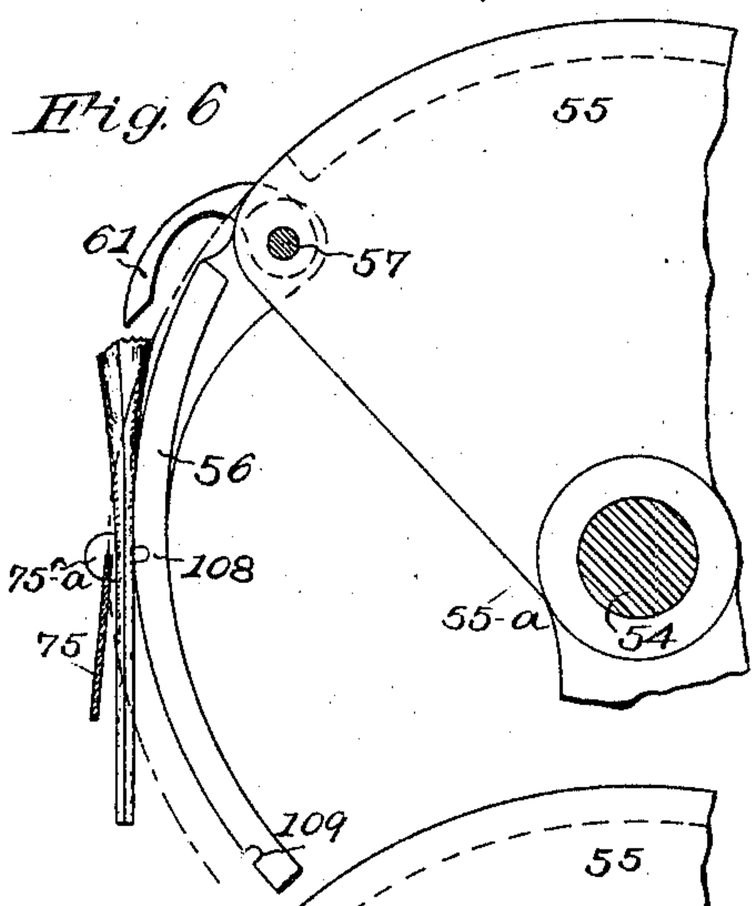

Fig. 7

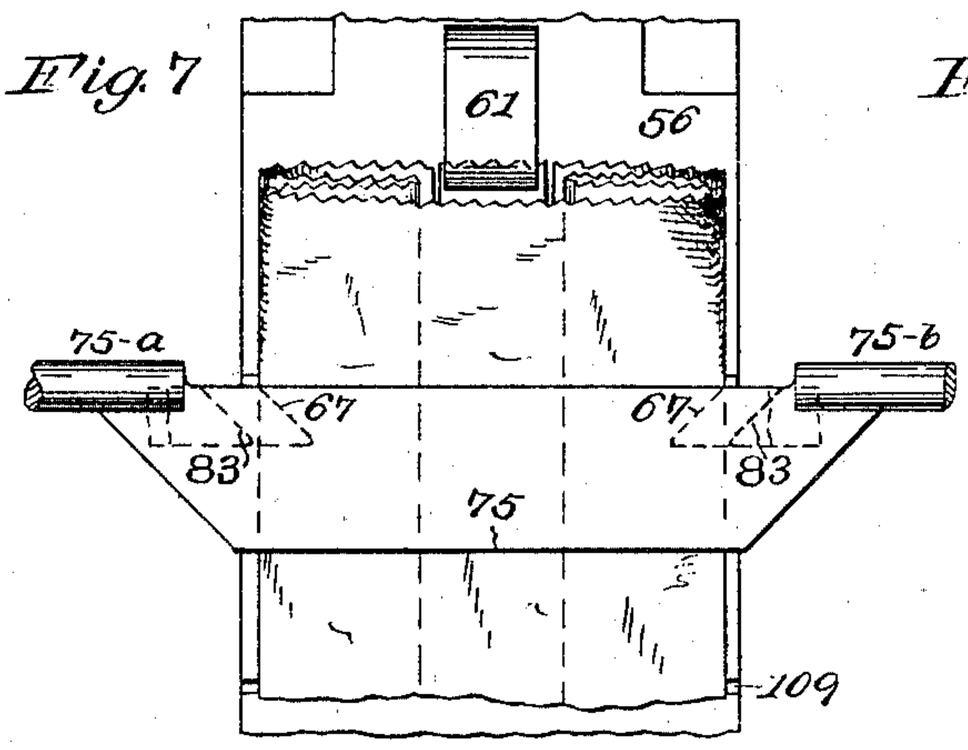

Fig. 8.

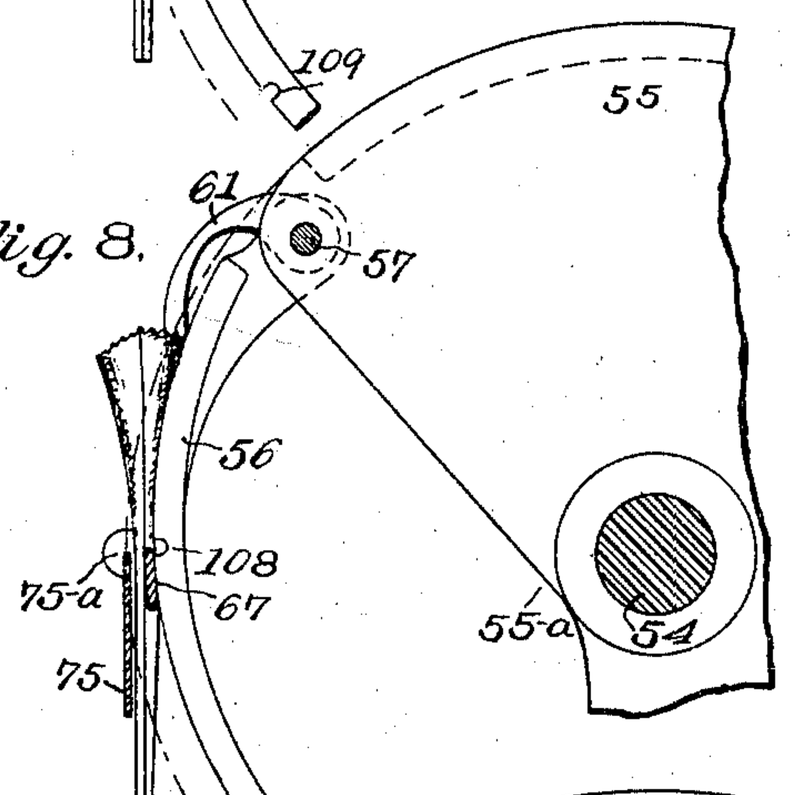

Fig. 9

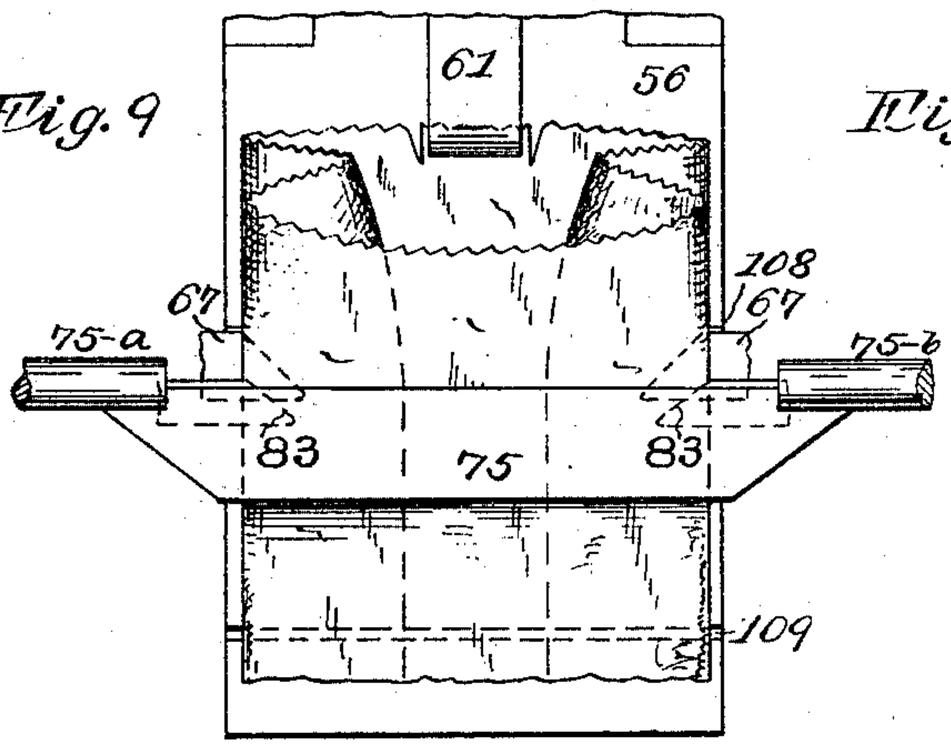

Fig. 10

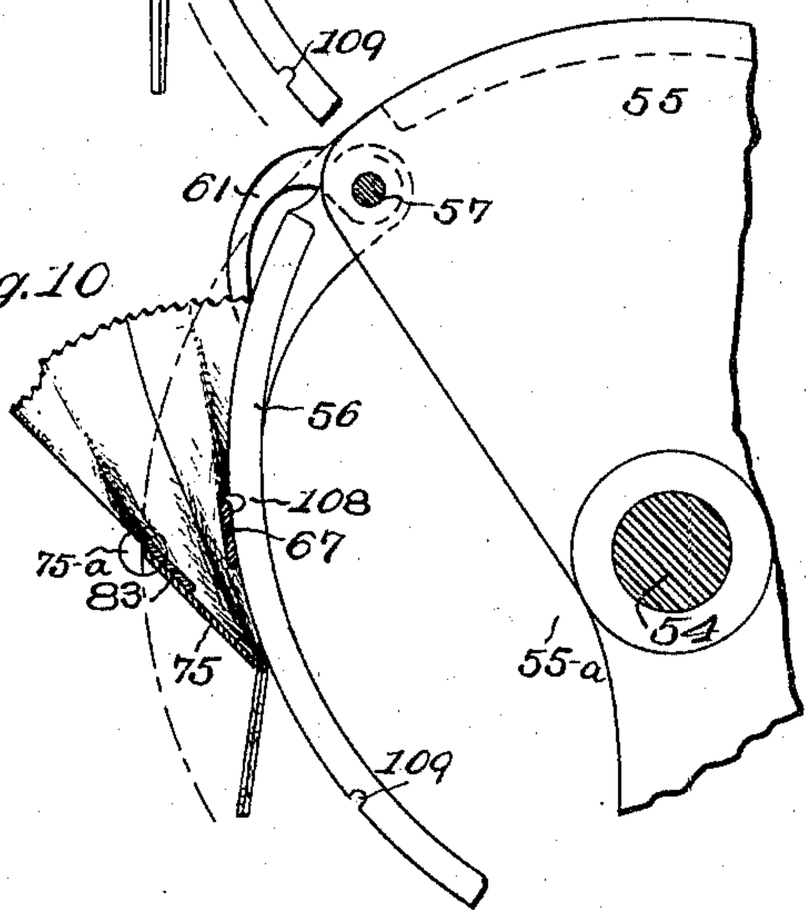

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Fig 11.

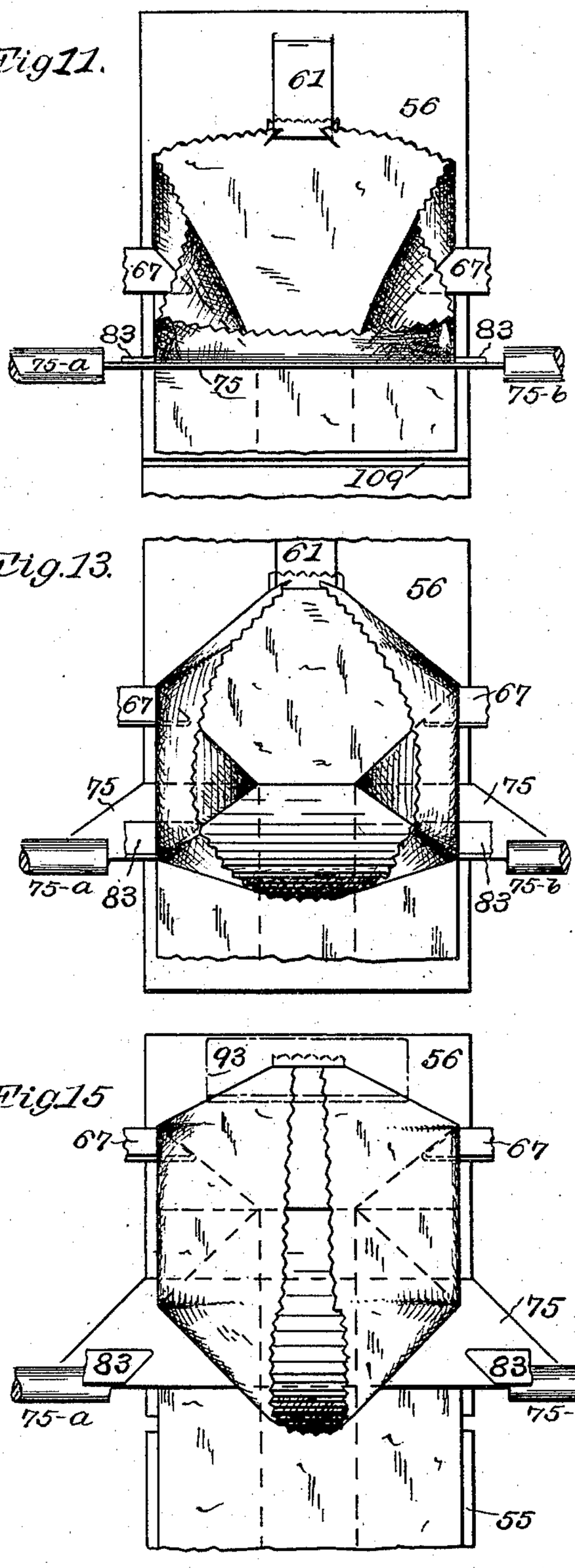

Fig. 12.

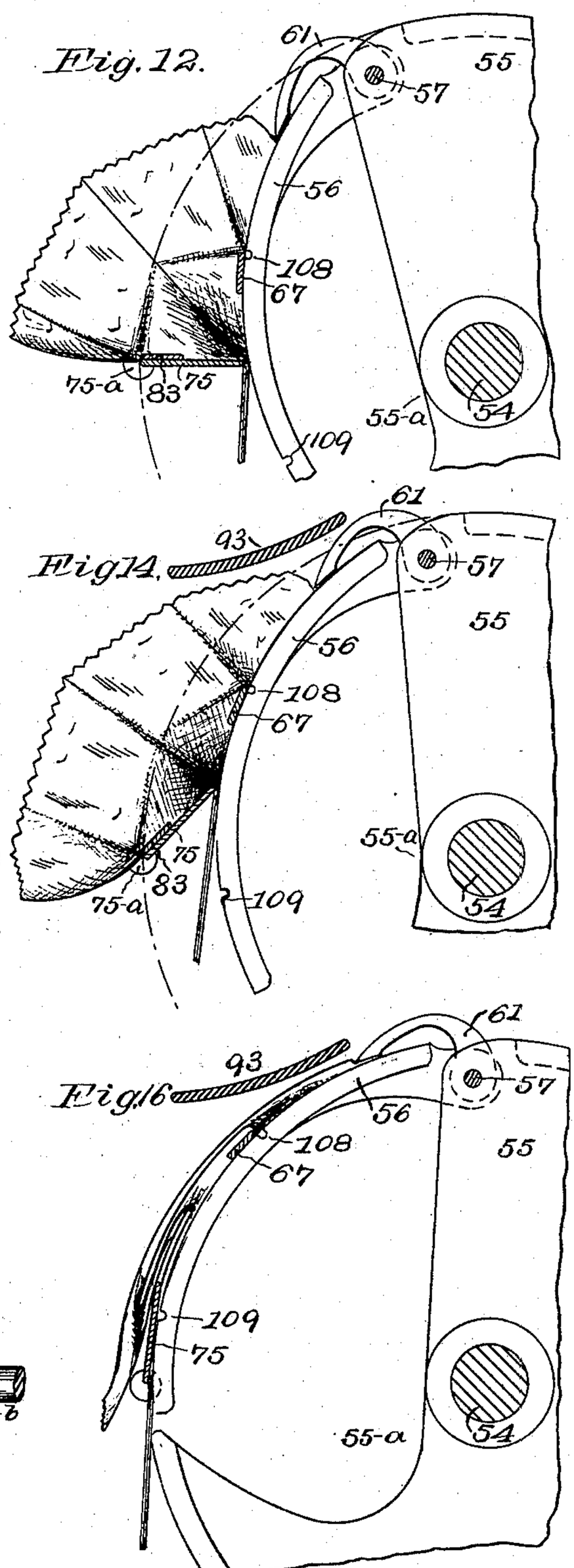

Fig. 13.

Fig 14.

Fig 15

Fig 16

Witnesses:
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(No Model.) 8 Sheets—Sheet 6.

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PAPER BAG MACHINE.

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Fig. 17

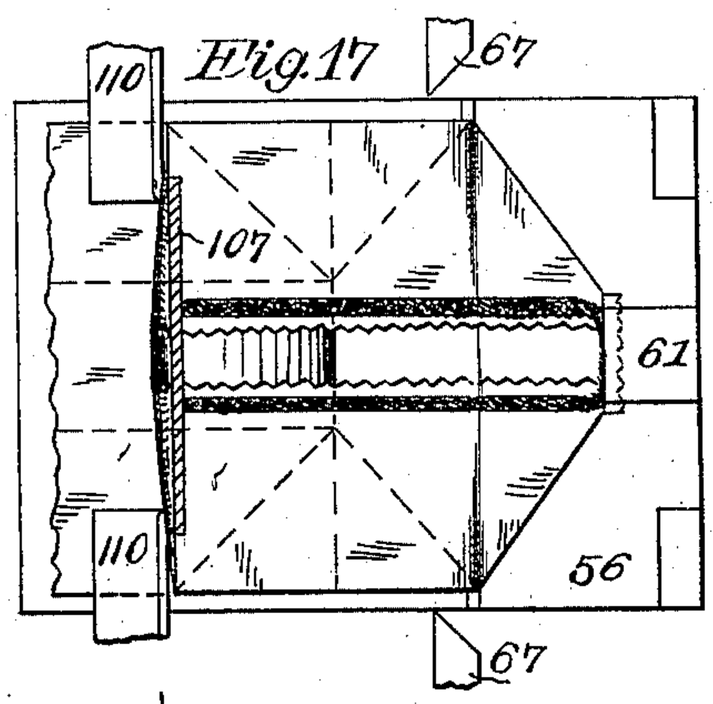


Fig. 19

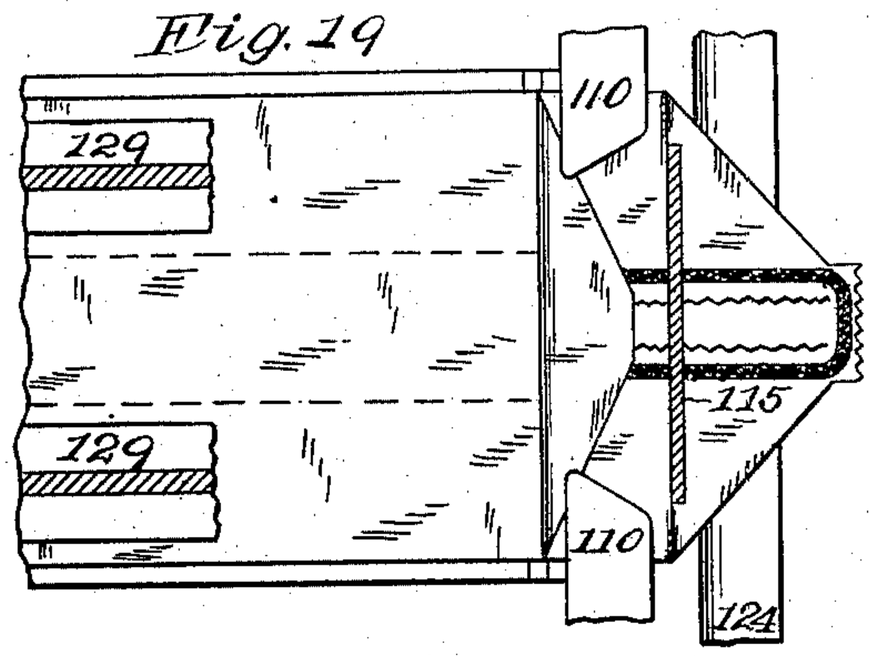


Fig. 18

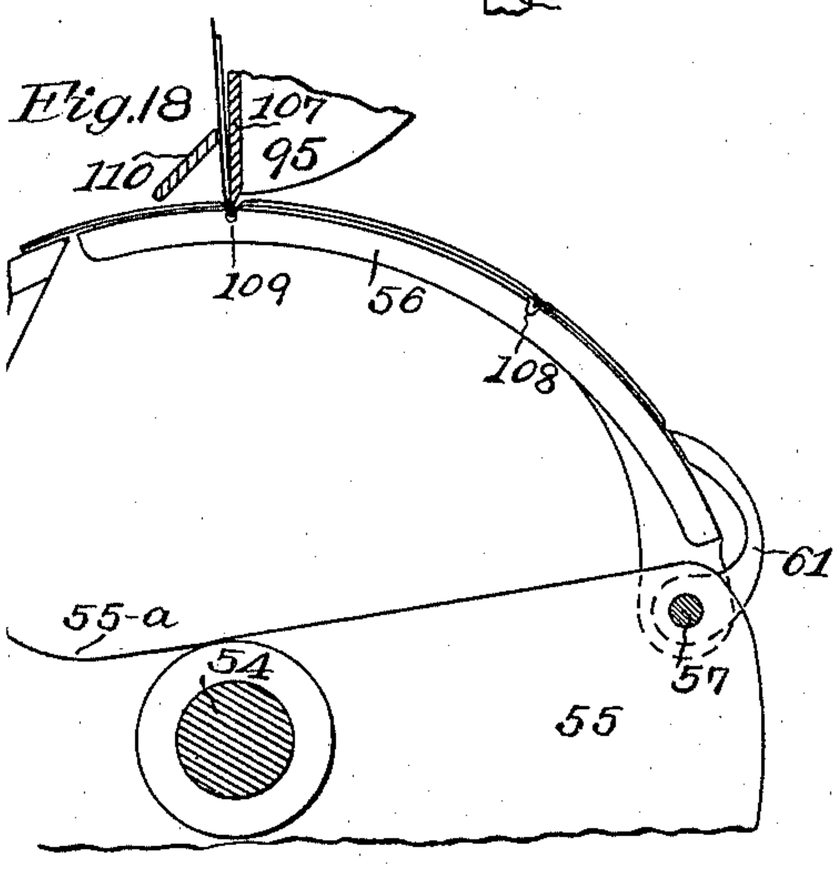


Fig. 20.

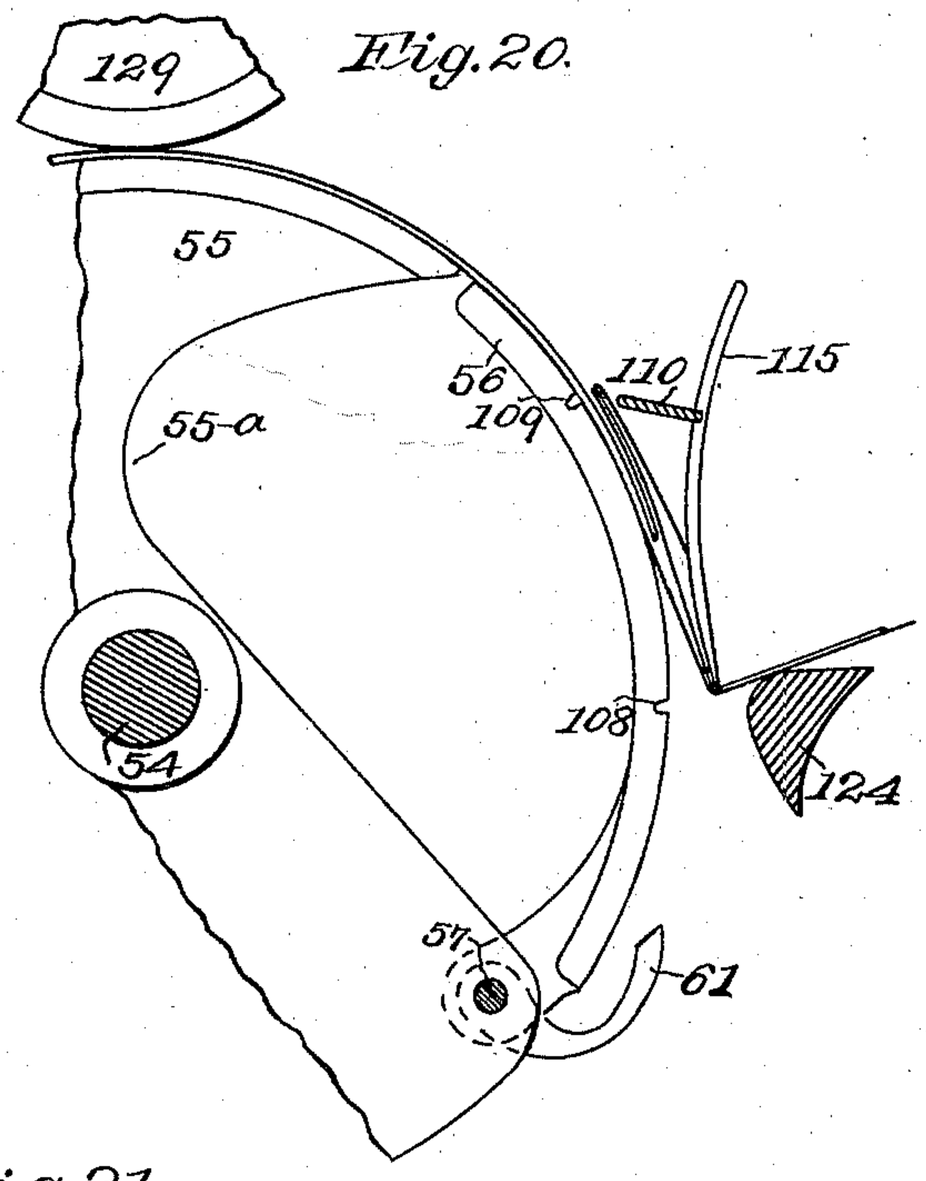
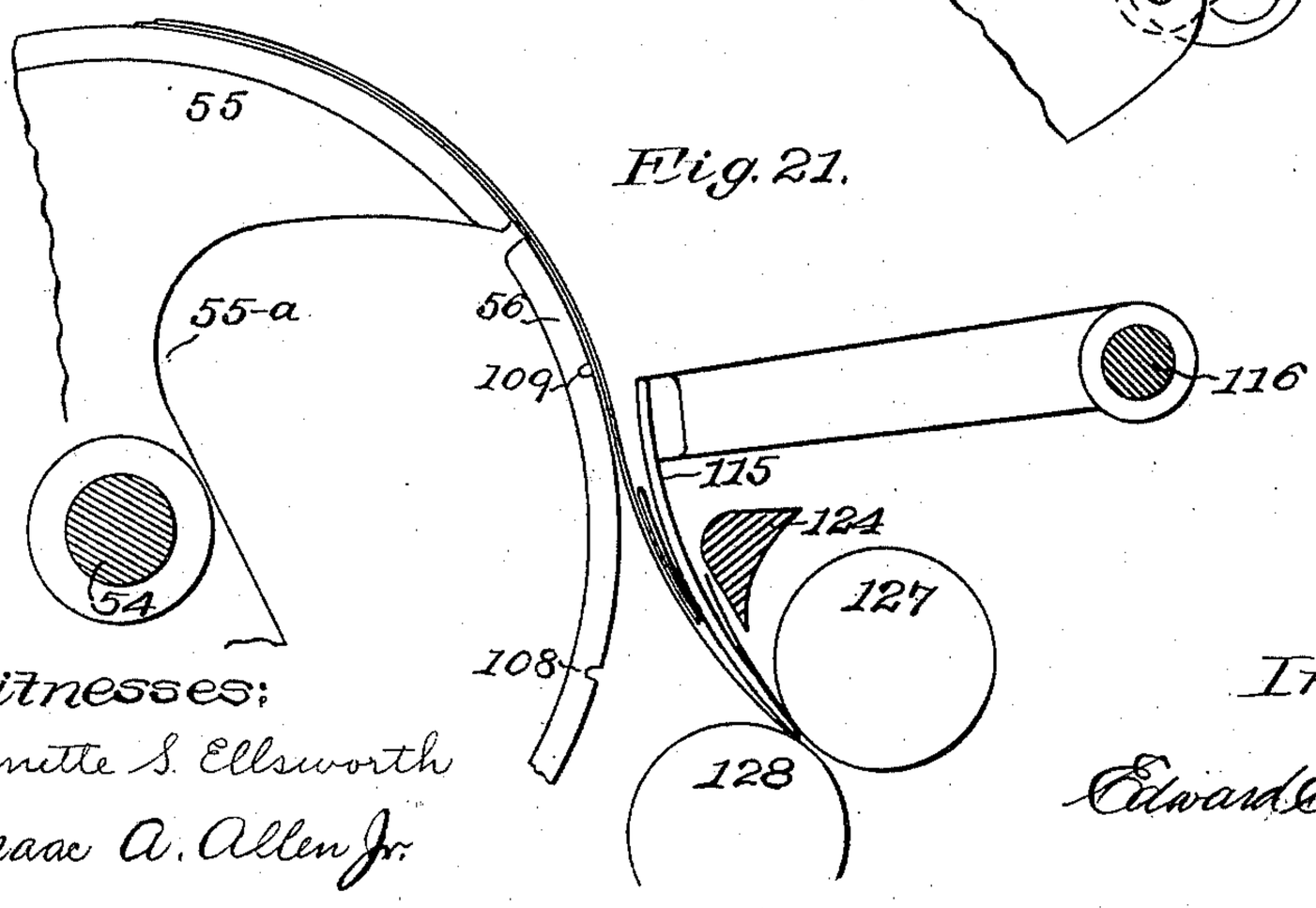


Fig. 21.



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(No Model.)

8 Sheets—Sheet 7.

E. E. CLAUSSEN.

PAPER BAG MACHINE.

No. 598,497. Patented Feb. 8, 1898.

Fig. 22

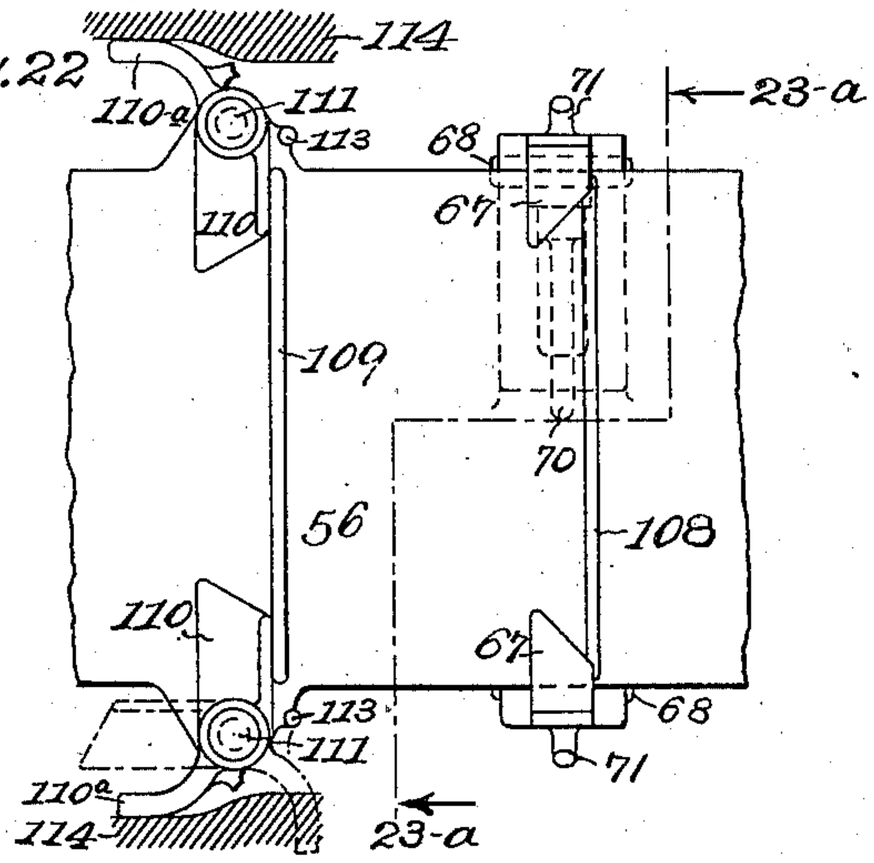


Fig. 23

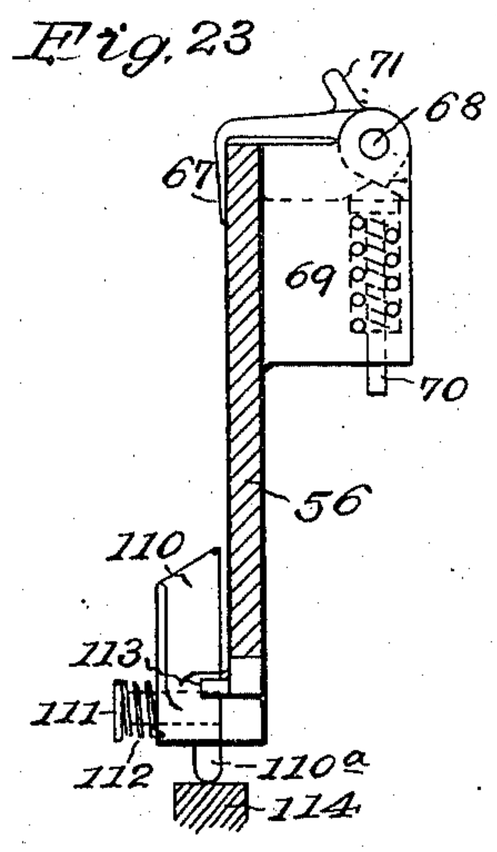


Fig. 24

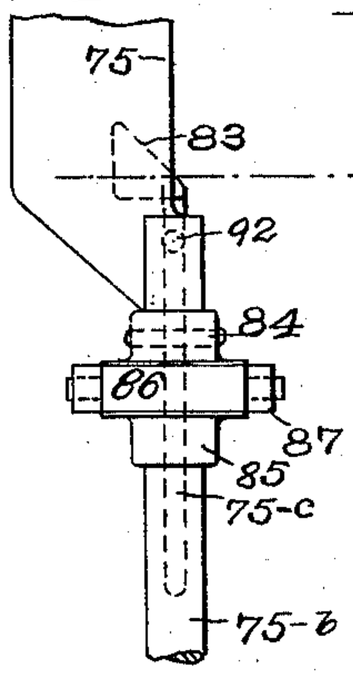


Fig. 25

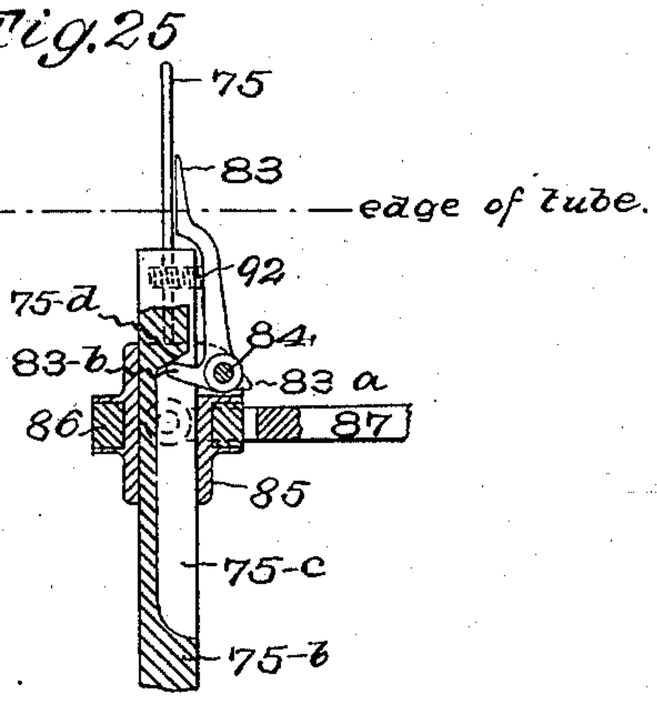
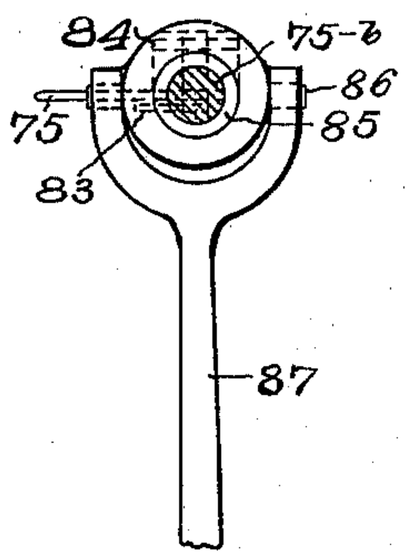


Fig. 26



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Inventor:
Edward E. Claussen

(No Model.)

8 Sheets—Sheet 8.

E. E. CLAUSSEN.

PAPER BAG MACHINE.

No. 598,497. Patented Feb. 8, 1898.

Fig. 28

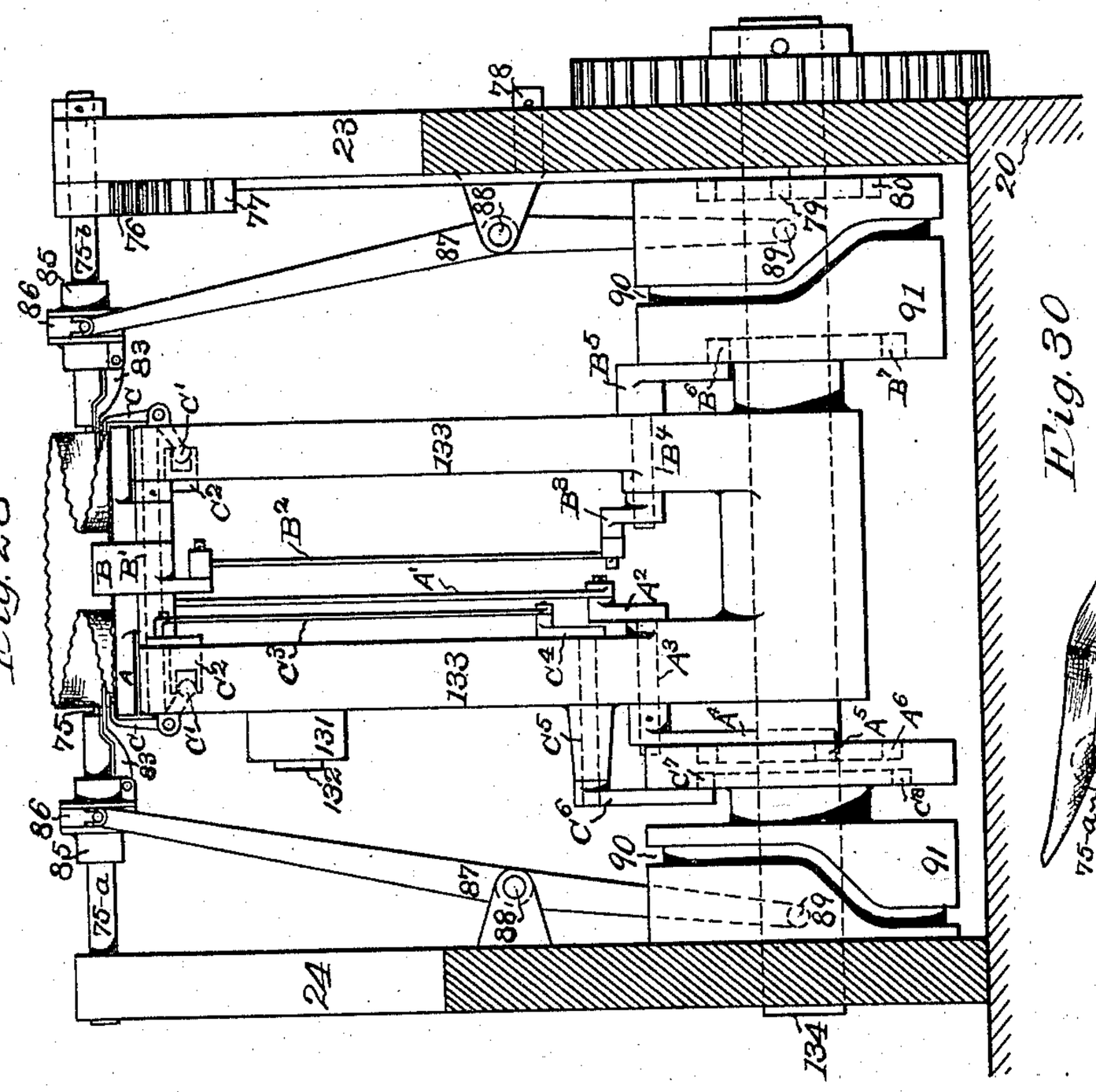


Fig. 30

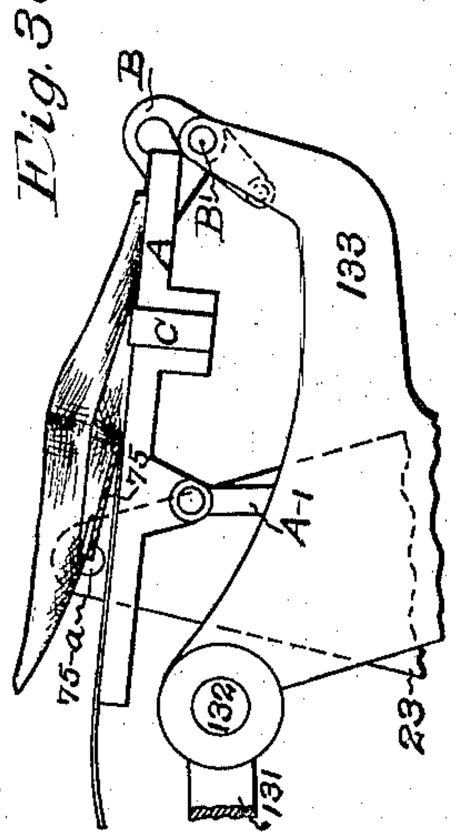


Fig. 29

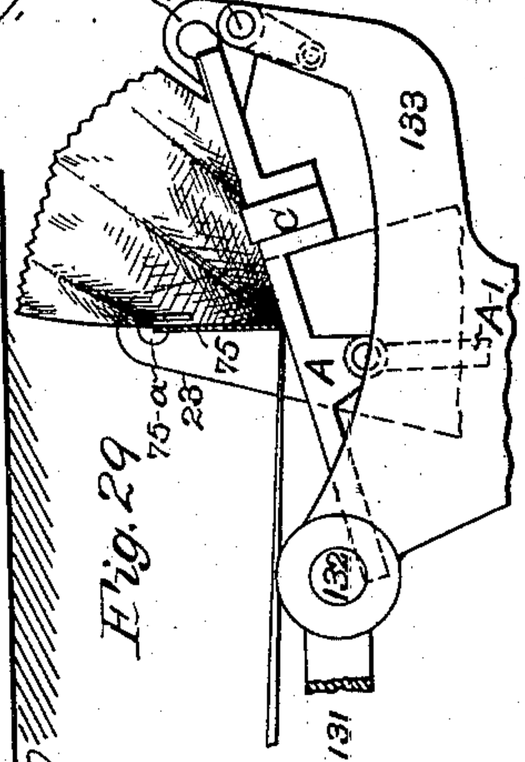
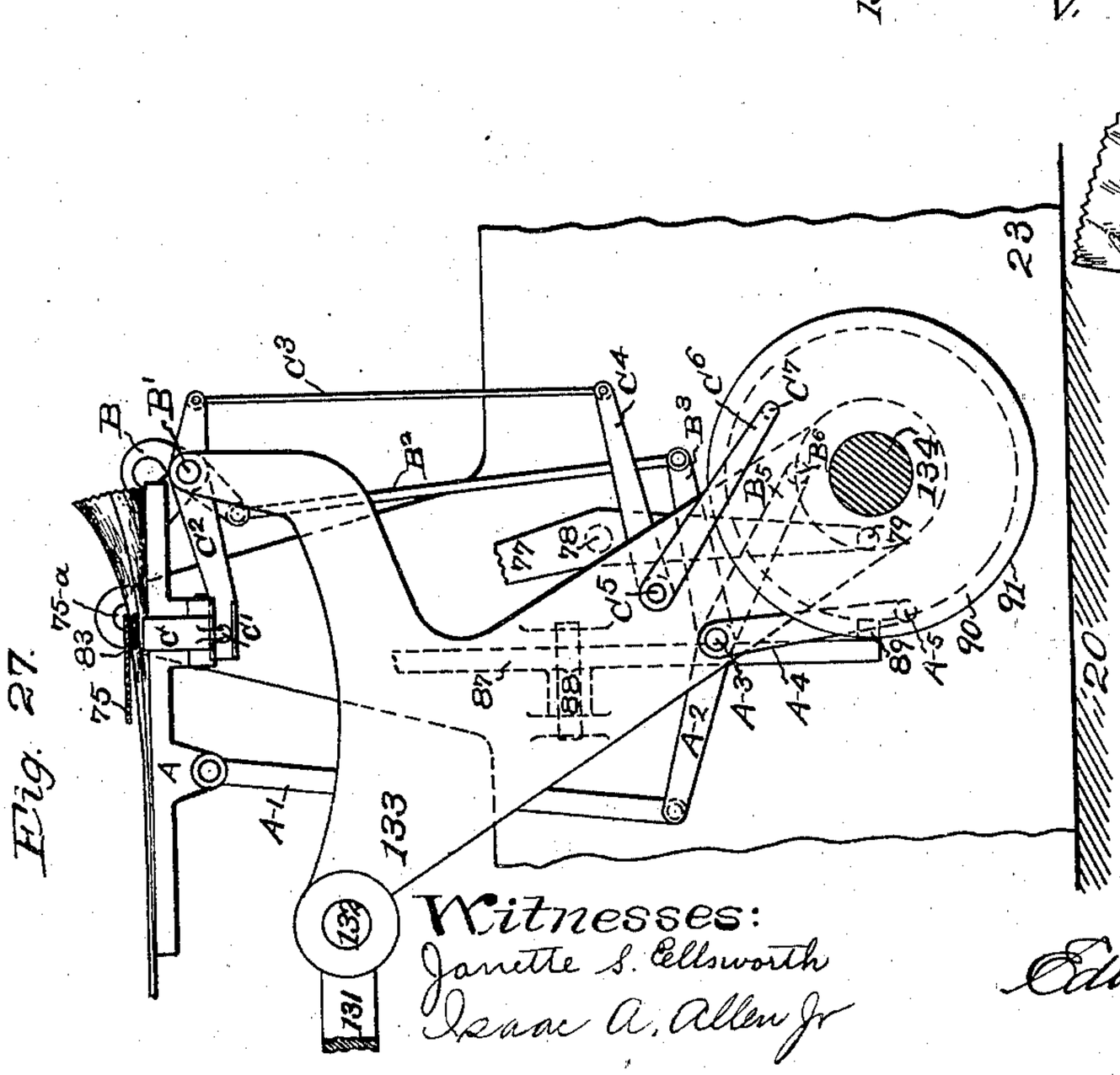


Fig. 27.



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Isaac A. Allen Jr

Inventor:
Edward E. Claussen.

UNITED STATES PATENT OFFICE.

EDWARD E. CLAUSSEN, OF HARTFORD, CONNECTICUT, ASSIGNOR TO ALBERT H. WALKER, TRUSTEE, OF SAME PLACE.

PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 598,497, dated February 8, 1898.

Application filed July 29, 1896. Serial No. 600,861. (No model.)

To all whom it may concern:

Be it known that I, EDWARD E. CLAUSSEN, a citizen of the United States, residing at Hartford, in the county of Hartford and State of Connecticut, have invented certain new and useful Improvements in Paper-Bag Machines, of which the following is a full, clear, and exact specification.

This machine automatically manufactures continuous tucked-paper tubing into square-bottom paper bags like those of Reissue Letters Patent No. 10,083.

The mechanisms herein shown and described have the folding-bed represented as a supplemental carrier, which is pivoted to a conveyer and adapted to be oscillated when the blank is held to that folding-bed and during the period the conveyer propels the carrier onward. The conveyer may be a continuous-rotating cylinder or a reciprocating or oscillating carriage, and I have therefore shown and described this invention in its adaptation to both of those types of machines.

In my present invention a continuous tucked tube is formed on a former, drawn through a set of drawing-rolls, and severed into bag-blank lengths and delivered into the bottom-forming mechanisms for forming the characteristic primary transverse folding-line and unfolding the tucks and forming the inside triangular folds, and the diamond-formed blanks thus produced are transferred to mechanisms for pasting, cross-folding, and closing the flaps to complete the bag.

The bottom-forming mechanisms consist of a vibrating tucker-plate provided with bevel-edged side nippers trunnioned in stationary frames and arranged to vibrate above the tubular blank in such a manner that as the bottom-forming end of the tube passes along beneath the same the bevel-edged side nippers swing into the tucks of the tube and clasp and hold them to the tucker-plate. Coacting with the tucker-plate is a supplemental carrier arranged and operating below the tubular blank and which is pivoted to the "conveyer," (as I have arbitrarily called the same,) which may be a cylinder, or on a rocking carriage, as is shown in the drawings. The supplemental carrier is also provided with a pair of bevel-edged side clips and a front clip, the former adapted to swing into the tucks of the bellows-sided tube and hold the plies of the lower tucks, and the latter arranged to swing down on the lower ply of the tube and hold the same to the supplemental carrier. The tube being held by these instrumentalities, the tucker-plate is caused to vibrate on its trunnions mounted in the stationary frames, and simultaneously the supplemental carrier is caused to oscillate, and thus the tube is unfolded, the primary transverse folding-line across the tubular blank is defined, the inside triangular folds formed, and the well-known diamond form produced.

The machine as herein shown and described in its preferred construction employs two supplemental carriers oscillating upon a cylinder; but it is obvious that one supplemental carrier will answer, or more than two can be arranged for, depending upon the length and size of the bag to be produced.

Figure 1 represents a right-hand side elevation of the machine of preferred construction, the conveyer being represented as a continuous-revolving cylinder. Fig. 2 is a left-hand side elevation of that which is represented in Fig. 1. Fig. 3 is a front view of the machine, drawn on an enlarged scale, showing the tucked-paper tube gripped between the drawing-rolls and in a position ready for the bottom-forming mechanisms to operate thereon, also showing the striker in a position ready to sever the blank from the continuous tube, and also showing a part of the broken-away former. Fig. 4 is a side view taken on the broken line 4 4 of Fig. 3 in the direction of the arrows. Figs. 5 to 21, inclusive, show plan and edge views of the blank at different stages when the bottom-forming mechanisms are in operation thereon or the flaps being folded. The views are drawn on an enlarged scale in relation to the previous views. Figs. 22 and 23 represent a plan and an end view of the bevel-edged side clips as arranged on the supplemental carrier, taken on the broken line 23^a of Fig. 22 in the direction of the arrows, also showing the mode of operation and detail construction of the rear-flap-folding mechanisms. Figs. 24, 25, and 26 are a plan, an end, and a side view of the tucker-plate with its side nippers operating thereon. Figs. 27 and

28 are a side and end view, respectively, of a modified form of the conveyer adapting the supplemental carrier to a rocking or reciprocating carriage and showing the blank clasped by the front clip and bevel-edged side clips to that carrier. Figs. 29 and 30 represent the blank in a further advanced stage than that shown in Fig. 27.

In the following specification and accompanying drawings similar letters and numerals of reference designate like or equivalent parts wherever found throughout the several views, and the numeral 20 designates the frame of the machine, to which is attached the former 21 in the well-known manner and which also supports at the lower end in brackets the roll of paper 22, from which the paper is drawn and folded into the continuous tucked tubing from which the bag-blanks are severed. At the upper end the frame carries on each side the uprights 23 and 24, in which the various shafts and mechanisms are journaled, as hereinafter more fully described.

Motion is communicated to the machine by means of the pulley 25, driven in the direction of the arrow 26, (see Fig. 2,) fastened to the shaft 27, which is journaled in the uprights 23 and 24 and carries on the inner side of the upright 23 a gear 28 and on the outer side of the upright the gear 29, from which the different mechanisms are driven.

The gear 28 meshes into the gear 30, which is fastened to the shaft 31, which is journaled in the uprights 23 and 24 and has fixed upon it the upper rear drawing-roll 32. The gear 30 meshes into the gear 34, which is fastened to the shaft 35, which is journaled in the uprights 23 and 24 and has fastened thereto the upper front drawing-roll 36. The gear 30 also meshes into the intermediate gear 37, which is rotatably mounted on the stud 38, fastened to the upright 23, and which meshes into the gear 40, fastened to the shaft 41, which is journaled in the uprights 23 and 24 and has fixed upon it the lower rear drawing-roll 42. The gear 40 meshes again into the gear 44, fastened onto the shaft 45, which carries the lower front drawing-roll 46. Fastened to the shaft 45, on the left-hand side of the drawing-roll 46, is the miter 47, meshing into the miter 48 on the striker-shaft 49, which is journaled in projecting lugs 24^a and 24^b of the upright 24 and carries clamped thereto the striker-arm 50, which revolves across the path of the tube, carrying it against the serrated knife 51 and severing a blank at each rotation. The gears 30, 34, 40, and 44, with their corresponding rolls 32, 36, 42, and 46, are so geared in relation to the striker-arm 50 that to each revolution of the striker-arm a suitable length of tubing is drawn forward to make the body and the bottom-forming end of the bag-blank.

By the means above described a continuous motion is transferred from the driving mechanisms to the drawing-rolls, the tucked-paper tube severed into bag-blank lengths and delivered to the bottom-forming mechanisms to perform their respective functions, as will now be explained.

On the right-hand side of the upright 23 and fastened to the shaft 27, as previously stated, is the gear 29, which meshes into the cylinder-gear 53, fastened to the shaft 54, which is journaled in the uprights 23 and 24, and has fastened thereto the mutilated cylinder 55, having the mutilations or sector-like sections 55^a and 55^b, into which the supplemental carriers are permitted to oscillate, and the tops or supporting-surfaces of the supplemental carriers form the supplement of the mutilation of the cylinder. The normal position of the supplemental carriers is that position where the tops or folding-surfaces of the carriers form the continuation of the cylinder. In the drawings two of these supplemental carriers are shown, (indicated by the numeral 56,) pivoted to the cylinder by the shaft 57, the free end of which has attached thereto the cam-arm 58, adapted to engage the stationary cam 59, mounted on the inwardly-projecting hub of the upright 23.

60 is a spring that keeps the cam-arm 58 in engagement with its cam, which is of such shape that as the supplemental carrier is carried around by the rotation of the cylinder the carrier is caused to be oscillated toward the center of the cylinder and immediately returned to its normal position, as clearly shown in the drawings from Figs. 3 to 21, inclusive.

The supplemental carriers are provided with front clips 61, fastened to shafts 62. Their free ends are provided with cam-arms 63, engaging the stationary cam 64, fastened to a projecting hub of the upright 24. The timing of the cam 64 in relation to the rotation of the cylinder and the severing of the blank by the rotation of the striker-arm is such that the front clip 61 is caused to close against the pressure of the spring 65 as the leading end of the tube advances and holds the lower ply of the tube thereto, as shown in Figs. 3 to 21, inclusive, to carry the same onward and to release the same again when the diamond form is completed. The supplemental carriers are also provided with two pairs of bevel-edged side clips—that is, with each front clip is coacting one pair of oppositely-disposed bevel-edged side clips 67, pivotally mounted on shafts 68 in bosses 69 beneath the folding-surfaces of the supplemental carriers. The side clips are held in an open or closed position by the spring-pressed plungers 70 and operated by the projections 71, as best shown in Figs. 22 and 23. These projections 71 are caused to operate as the cylinder revolves by the cam-strips 72 and 72^a, respectively fastened on the right-hand side of the machine to the stationary cam 59 and on the left-hand side to the stationary cam 64. The cam 59, which causes to operate the supplemental carriers 56, the cam 64, which

causes to operate the front clips 61, and the cam-strips 72 and 72ª, which cause to operate the bevel-edged side clips as the cylinder revolves, are so shaped in relation to the rotation of the cylinder and the advancing bottom-forming end of the tucked-paper tube that the folding-surface of the supplemental carrier is slightly brought out of its normal position—that is, out of the circular path of the cylinder, (see Figs. 4, 5, and 6)—to enable the tucks of the tube to distend and open to allow the side clips, as well as the front clips, to enter more readily and hold the lower ply of the tube and the lower plies of the tucks to that supplemental carrier and to carry the blank onward, while the remainder of the bottom-forming mechanisms that are mounted above the paper-bag blank are in engagement therewith, as will now be fully explained.

Above the paper-bag blank is mounted the tucker-plate 75 in trunnions 75ª and 75ᵇ in the stationary uprights 23 and 24 and capable of being vibrated by means of the pinion-sector 76, rigidly connected to the trunnions 75ᵇ and meshing into the sector 77, pivotally mounted on the stud 78, which is attached to the inner side of the upright 23. The lower projecting arm of the sector 77 is provided with the projection 79, engaging a cam-groove 80 in the gear 28.

The vibrating tucker-plate is provided with two oppositely-disposed bevel-edged side nippers 83, pivotally mounted by the pivots 84 in the slides 85, which are adapted to receive a lateral oscillatory motion by means of the collars 86, the laterally-projecting trunnions of which engage the bifurcated arms 87, pivoted in the projecting hubs of the uprights 23 and 24 on the studs 88. The lower ends of the arms 87 are provided with the extensions 89, engaging cam-grooves 90 of cams 91. Springs 92 tend to press the nippers away from the tucker-plate, and thus open the same to the extent permitted by the lugs 83ª, which come in contact with the collar 86. The nippers 83 are closed and pressed on the tucker-plate by means of extension 83ᵇ, projecting into the spline 75ᶜ of the trunnions and abutting the end of the spline in the trunnions, as at 75ᵈ. The inward motion of the arms 87 thus cause to close and press the nippers on the tucker-plate, as is clearly illustrated in Figs. 24, 25, and 26. The center line of the trunnions 75ª and 75ᵇ coincides with a line that passes through the two intersecting points formed by the edges of the tube and the forty-five-degree edges of the nippers.

The distance from the center line of the trunnions to the folding edge of the tucker-plate is substantially equal to the depth of the tucks, and that folding edge serves to define the primary transverse folding-line across the tubular blank as the same is propelled onward by the cylinder. The timing of the cam-grooves 90, that cause to operate the side nippers, and the cam-groove 80 in the gear 28, that causes to vibrate the tucker-plate 75, is in relation to the rotation of the cylinder and the supplemental carrier carried thereby with its clips such that as the bottom-forming end of the tube enters the folding mechanisms the tube is gripped by grippers on the supplemental carrier and simultaneously the nippers enter the tucks and hold the upper plies of the tucks to the tucker-plate. The supplemental carrier as it is carried along by the cylinder is then caused to swing away from the tucker-plate and simultaneously the tucker-plate is caused to vibrate at the rate of speed of the combined movement of the carrier and the rotation of the cylinder, and in this manner the tucks of the tube are distended and unfolded into the well-known inside triangular folds, and the tucker-plate defines the primary transverse folding-line across the tube, as is clearly shown in the drawings in Figs. 5 to 16, inclusive, and converts the tubular blank of Figs. 5 and 6 into the diamond form of Figs. 15 and 16.

As the supplemental carrier rocks from its lowest position back to the normal position the formation and the flattening of the diamond are aided by rocking against a stationary folder-plate, as at 93, (see Figs. 14 to 16,) held on a rod supported by the uprights 23 and 24. After the diamond is completed the paste is applied by sector 95, fastened to shaft 96, carrying connected thereto the gear 97 and meshing into the cylinder-gear 53. The gear 97 also drives the gears 98 and 99 on shafts 100 and 101, which have fastened thereto the paste-quadrant 102 and paste-roll 103, the latter turning in the paste-box 104.

The gears 97, 98, and 99 are geared with relation to the cylinder-gear 53 in such a manner that the face of the sector is presented to the cylinder twice to each revolution of the cylinder, and in this manner the paste is deposited upon each diamond-formed blank as it passes under the paste-sector.

The folding of the rear and front flaps is accomplished as follows: The paste-sector 95 has fastened thereto the two creaser-blades 106 and 107 at a distance apart measured on the circumference of the paste-sector equal to twice the depth of the tucks, which distance corresponds with the distance between the transverse creaser-grooves 108 and 109 in the supplementary carriers. To the supplementary carriers are pivotally mounted on studs 111, carried by lugs projecting on each side thereof, the plicators 110, held in their normally open position, as shown in Fig. 22 in the dash-and-dotted position, by springs 112 against stop-pins 113. The outer ends of the plicators have the projections 110ª, which as the carriers are carried around come in engagement with stationary cams 114, mounted on hubs, turning the same into the positions of Fig. 22 and beyond, as shown therein. The folding ends of the plicators that come in contact with the rear flap are preferably beveled about forty-five degrees,

with the tangential line passing through a point in the circumference of the cylinder where the plicators approach the nearest. The folder 115 for turning and folding the front flap is mounted on shaft 116, and journaled in the uprights 23 and 24, and on the left-hand side the shaft has fastened thereto an arm 117, to which is connected the connecting-rod 118, to the lower end of which is hinged the cam-arm 119 on the stationary stud 120. At the upper end of the arm 119 the same is provided with the projection 121, adapted to enter the cam-groove 122 of the cam 123. The folder-bar 124 reaches across from the upright 23 to the upright 24, and over that folder-bar the front flap is folded, as shown in Figs. 4, 19, 20, and 21, and then the completely-folded blank is delivered to bands 125 and 126, passing over delivery-rolls 127 and 128. The timing of the cams 114, that operate the plicators 110, and the timing of the cam 123, that operates the folder 115, and the timing of the cam 64, that operates the front clip 61, are such relatively to each other and to the rotation of the cylinder that the front clip 61 releases the forward end of the diamond blank before the cylinder has revolved far enough to carry that forward end down opposite the bar 124 and so that the plicators turn the rear end of the diamond form over upon the middle of the diamond form before the cylinder has revolved far enough to put the groove 109 opposite the bar 124 and so that the folder 115 thereupon engages with the blank along the transverse crease opposite the groove 109 and carries that part forward under the bar 124 into the bite of the rolls 127 and 128, and thus causes the bar 124 to fold the forward end of the diamond form backward over the middle part of the diamond form and over the rear flap, so as to complete the folding of the bag.

Figs. 27, 28, 29, and 30 represent this machine in the form where the supplemental carrier is attached to an oscillating conveyer instead of to a rotating cylinder.

The connecting-rod 131 is worked by a crank (not shown in the drawings) and is pivoted by a stud 132 to the rocking carriage 133, and that carriage rocks upon the shaft 134 in the uprights 23 and 24. The operation of the vibratory tucker-plate 75, with its coacting side nippers, is identical with the foregoing description, and therefore needs no further explanation. The supplemental carrier A receives an oscillatory motion by means of the connecting-rod A′, attached to arm A^2 on the shaft A^3, mounted in the carriage 133, the outer free end having attached the arm A^4, provided with projection A^5, engaging the cam-groove A^6.

At the front end of the carriage is pivotally mounted the front clip B on the stud B′ and operatively connected to the connecting-rod B^2, attached to the arm B^3, fastened to the shaft B^4, the free end of which has connected thereto the cam-arm B^5, provided with the extension B^6, engaging the cam-groove B^7. The bevel-edged side clips C, which are pivoted in hubs adjacent to and below the folding-surface and on oppositely-disposed sides of the supplemental carrier, have the extensions C′, which engage the arms C^2, which are fastened to the shaft B′, operatively connected to the connecting-rod C^3, the lower end of which is pivoted to the arm C^4, fastened to the shaft C^5, on the outside of which is carried the arm C^6, having the extension C^7, which engages the cam-groove C^8. The cam-groove A^6, that causes to operate the supplemental carrier A, the cam-groove B^7, that operates the front clip B, and the cam-groove C^8, that operates the side clips C, are timed in relation to the oscillation of the reciprocating carriage 133 so that when the carriage is in the position nearest to the drawing-rolls the supplemental carrier is lowered to the amount to safely allow for the entering of the bottom-forming end of the tucked-paper tube between the carrier and the tucker-plate. The front clip B and the side clips C are then caused to close, the former holding the lower ply of the tube and the latter entering into and between the tucks and holding the lower plies of the tucks. Simultaneously the side nippers 83 enter the tucks and hold the upper plies of the upper tucks to the vibrating tucker-plate. The blank being held by the instrumentalities just described, the carriage 133 is rocked forward, the supplemental carrier A is caused to be lowered, and the tucker-plate caused to be vibrated by its respective cams through the positions as shown in Figs. 29 and 30, thus unfolding the tucks and producing the inside triangular folds and defining the primary transverse folding-line across the tubular blank and converting the tucked-paper tube into the well-known diamond form, which may then be drawn from the carriage and the end flaps folded by any of the well-known mechanisms.

The operation of the machine is as follows: The paper is taken from the roll 22 at the base of the frame, folded around the former 21, and converted into a continuous tucked-paper tube, which is guided into the bite of the drawing-rolls 42 and 46, under the serrated knife 51, and between the rolls 32 and 36, and as the striker revolves across the path of the tube it forces the tube against the serrated edge of the knife 51 and severs the blank therefrom at each revolution. The drawing-rolls are so geared with relation to the revolution of the striker as to feed through a suitable length for each rotation thereof. The bottom-forming end of the tube is then guided into the bottom-forming mechanisms in such a manner that the same enters between the tucker-plate 75, provided with the bevel-edged side nippers 83, and the supplemental carrier 56, which is pivotally mounted to the cylinder 55 and which is provided with the front clip 61 and the two oppositely-disposed

bevel-edged side clips 67. The tube as it arrives at about the position as shown in Figs. 5 and 6 is clasped by the front clip 61, the same being carried by the cylinder, and by virtue of the cam 64 the side clips 67 are then caused to close by means of the cam 72, thus holding the lower part of the tube to the supplemental carrier. Simultaneously the side nippers 83 are caused to close by means of cam-groove 90, and as the cylinder continues to rotate the supplemental carrier is swung away from the tucker-plate and the tucker-plate vibrated at the same time, the folding edge forming the characteristic primary transverse folding-line across the tubular blank and unfolding and forming the well-known inside triangular folds, passing from the positions as shown in Figs. 5 to 16, inclusive, and converting the tubular blank into the diamond form. The paste is then applied thereto from the paste-box 104, the roll 103, quadrant 102, and the paste-sector 95, to which are attached the creaser-blades 106 and 107, which engage the transverse creaser-grooves 108 and 109, respectively, the creaser-blade 107 and the creaser-groove 108 coöperating to make a crease across the diamond blank and thereby to somewhat raise the rear end of the diamond, which is immediately backed up by the plicators 110, carried by the supplemental carrier and engaging the cam 114, as shown in Figs. 17 and 18. The motion of the plicators continues until the flap is completely turned forward, and meanwhile the front clip 61 has been opened, the spring of the paper causing the front flap to be thrown over the flap-bar 124 and against the folder-blade 115. Each plicator is then returned to its normal position and the folder-blade then caused to move downward at a rate to remain with its folding edge in the creased line formed by the creaser-blade 106 and the groove 108 until the bag is delivered into the bite of the delivery-rolls and carried away by the bands 125 and 126 into a drier to be dried, and afterward bound and packed for sale and use.

This machine is distinguished from all prior machines for making square-bottom paper bags in many respects, one of which consists in the new mode of operation by which it folds the diamond form of the paper. That new mode of operation includes carrying both plies of the paper tube at the primary transverse folding-line, which is defined by the lower edge of the tucker-plate, forward under the secondary transverse folding-line, across the upper ply of the paper tube, which is afterward defined by the creaser-blade 107, and the creaser-groove 108, instead of carrying the secondary transverse folding-line backward over the primary transverse folding-line. In this new mode of operation the carrier oscillates inward from its normal position while it is coöperating with the tucker-plate to make the primary transverse fold and the inwardly-inclined triangular folds during the first half of that making and oscillates outward to its normal position while it is thus coöperating during the last half of that making, whereas in every prior machine the folding-bed which most nearly corresponds with the carrier of this machine does not thus oscillate while those folds are being made, but simply holds the lower ply of the paper tube against all oscillation while the upper ply is being turned over backward upon itself. It results from this new mode of operation that all the devices which act upon the paper to make the primary transverse fold and the inwardly-inclined triangular folds are moving forward while they are making them, whereas in the prior machines some devices which help to make those folds are moving backward at that time, and this new result is promotive of speed and also of some of the other superiorities which characterize this machine.

I claim as my invention—

1. The combination of a conveyer; an oscillating carrier having its forward end pivoted to the conveyer; mechanism to oscillate the carrier upon its pivot, and devices to cooperate with the carrier, during both parts of its oscillation, and during its forward movement with the conveyer, to unfold a paper tube, and to refold it into a paper-bag blank.

2. The combination of a conveyer; an oscillating carrier, pivoted to the conveyer; mechanism to oscillate the carrier upon its pivot, and a tucker-plate vibrating upon trunnions not substantially on a line with its defining edge; all coöperating during the forward movement of the conveyer, and during both parts of the oscillation of the carrier, and during the vibration of the tucker-plate, to unfold a paper tube, and to refold it into a paper-bag blank.

3. The combination of a conveyer; an oscillating carrier, pivoted to the conveyer; mechanism to oscillate the carrier upon its pivot, devices to hold the lower ply of a tucked-paper tube upon the face of the carrier; a tucker-plate vibrating upon trunnions not substantially on the line with its defining edge; and devices to hold the upper ply of a tucked-paper tube, against the face of the tucker-plate, between the line of its trunnions, and the line of its defining edge; all coöperating, during the forward movement of the conveyer, and during both parts of the oscillation of the carrier, and during the forward vibration of the tucker-plate to unfold a tucked-paper tube, and to refold it into a paper-bag blank, having inwardly-inclined triangular folds.

4. The combination of a rotating conveyer; two or more oscillating carriers, pivoted to the conveyer; mechanism to oscillate each carrier upon its pivot, and one set of mechanism placed and adjusted to coöperate with each of the carriers successively, during the forward movement of the conveyer, and during both parts of the oscillation of that carrier, to unfold a paper tube, and to refold it into a paper-bag blank.

5. The combination of a rotating conveyer; two or more oscillating carriers, pivoted to the conveyer; mechanism to oscillate each carrier upon its pivot; devices to hold the lower ply of a tucked-paper tube upon the face of each carrier; a tucker-plate, vibrating upon trunnions not substantially on the line with its defining edge; and devices to hold the upper ply of a tucked-paper tube, against the face of the tucker-plate, between the line of its trunnions, and the line of its defining edge; all coöperating during the forward movement of the conveyer, and during both parts of the oscillation of each carrier, and during the forward vibration of the tucker-plate, to unfold a tucked-paper tube, and to refold it into a paper-bag blank, having inwardly-inclined triangular folds.

6. In a paper-bag machine the combination of the cylinder provided with a mutilation, the carrier pivotally mounted on that cylinder and means for imparting thereto an oscillatory motion by a cam and adapted to swing the same into the mutilation of the cylinder, the folding-surface of that carrier forming the continuation of the folding-surface of the cylinder, when the carrier is in its normal position, and devices coöperating with that carrier to effect the unfolding of the tucked-paper tube.

7. In a paper-bag machine the combination of the cylinder provided with a mutilation, the carrier pivotally mounted on that cylinder and means for imparting thereto an oscillatory motion by a cam and adapted to swing the same into the mutilation of the cylinder, the folding-surface of that carrier forming the continuation of the folding-surface of the cylinder when the carrier is in its normal position, and being provided with the front clip and the two oppositely-disposed side clips and devices coöperating with the carrier to effect the unfolding of the tucked-paper tube substantially as described.

8. In a paper-bag machine, the combination of a conveyer; an oscillating carrier pivoted thereto, and provided with means to hold the lower part of the tubular blank thereto; the tucker-plate provided with means to hold the upper part of the tubular blank; the parts combined and operating to distend and unfold the tucked-paper tube, while the carrier is oscillated, and operating means to cause the tucker-plate to vibrate and define the primary transverse folding-line across the blank; the whole operating to convert the blank into the diamond form, substantially as described, while the blank is carried onward by the conveyer.

9. In a paper-bag machine, the combination of a conveyer; an oscillating carrier pivoted thereto, operating means to cause the same to oscillate and means to hold the lower part of the tubular blank thereto; the tucker-plate trunnioned in the uprights and provided with the side nippers, operating means to cause the tucker-plate to vibrate, and means to close the nippers on the tucker-plate, all parts combined and operating to distend and unfold the tucked-paper tube and form the inside triangular folds while the carrier oscillates and the tucker-plate defines the primary transverse folding-line across the blank; the whole operating to convert the blank into the diamond form, while the blank is carried onward by the conveyer substantially as described.

10. In a paper-bag machine the combination of the conveyer, the carrier pivotally mounted thereon, operating means to cause the same to be oscillated, and the front clip and the two oppositely-disposed side clips arranged to swing down upon the lower part of the tubular blank and hold the same to the carrier, the tucker-plate trunnioned in the uprights and provided with the side nippers, operating means to vibrate the tucker-plate and operating means to cause the side nippers to swing down onto the tucker-plate and hold the upper part of the tubular blank, all parts combined and operating to distend and unfold the tubular blank to form the inside triangular folds while the tucker-plate defines the primary transverse folding-line across the blank, the whole operating to convert the tucked-paper tube into the diamond form, while the same is carried onward by the conveyer substantially as described.

11. In a paper-bag machine the combination of the cylinder provided with a mutilation, the carrier pivotally mounted on the cylinder, means for imparting thereto an oscillatory motion and a front clip and the two oppositely-disposed side clips, the tucker-plate trunnioned in the uprights and provided with the side nippers, and operating means to vibrate the tucker-plate so that the folding edge travels with the combined movement of the cylinder and the carrier in order to define the primary transverse folding-line substantially as described.

12. In a paper-bag machine the combination of the cylinder provided with a mutilation, the carrier pivotally mounted on the cylinder, means for imparting thereto an oscillatory motion and a front clip and the two oppositely-disposed side clips arranged to swing down upon the lower part of the tubular blank and hold the same to the carrier, the tucker-plate trunnioned in the uprights 23 and 24 and provided with the side nippers, and operating means to vibrate the tucker-plate so that the folding edge travels with the combined movement of the rotating cylinder and the oscillating carrier to define the primary transverse folding-line and unfold the tucked-paper tube into the diamond form while the blank is being carried onward substantially as described.

13. A folding-bed adapted to support one side of a paper-bag blank, a tucker-plate having a folding edge adapted to define the transverse folding-line across the blank on the other side of the blank and provided with trunnions, slides adapted to reciprocate on said trun-

nions, nippers pivotally mounted on the slides, the annular collar surrounding the slides, and operating means to carry the slides with the nippers laterally.

14. A carrier provided with means adapted to support and hold one side of a paper-bag blank, a tucker-plate having a folding edge adapted to define the transverse folding-line across the blank on the other side thereof and provided with trunnions mounted in the uprights of the machine with means to cause the same to be vibrated, the slides adapted to slide on the trunnions and carrying the nippers pivotally mounted thereon, the springs 92 for holding the nippers in the normally open position, the annular collar surrounding the slides and operating means for carrying the slides with the nippers laterally substantially as described.

15. A carrier provided with means to support and hold one side of a paper-bag blank a tucker-plate having a folding edge adapted to define a transverse folding-line across the blank on the other side thereof and provided with trunnions mounted in the uprights of the machine with means to cause the same to be vibrated, the slides adapted to slide on the trunnions and carrying the nippers pivotally mounted thereon, with the projection 83^b engaging the spline in the trunnions, means to cause the slides to oscillate, and means to cause the same to close and press on the tucker-plate all combined and operating substantially as described.

16. A folding-bed adapted to hold one side of a paper-bag blank, a tucker-plate having a folding edge adapted to define the transverse folding-line across the blank on the other side thereof, and provided with trunnions mounted in the uprights of the machine and means to cause the same to vibrate, the slides adapted to slide on the trunnions and carrying the nippers pivotally mounted thereon and the springs 92 for holding the nippers in the normally open position, projections 83^b engaging the splines of the trunnions and causing the same to vibrate with the trunnions and the tucker-plate; substantially as described.

17. A folding-bed adapted to hold one side of a paper-bag blank, a tucker-plate adapted to define the primary transverse folding-line across the blank on the other side thereof and provided with trunnions mounted in the uprights of the machine, the distance from the center-line of the trunnions to the folding edge of the tucker-plate being of substantially the depth of the tucks of the tube, operating means to cause the same to be vibrated, the slides adapted to oscillate on the trunnions and vibrate with the same and carrying pivotally mounted the bevel-edged side nippers, springs 92, to open the nippers when the projection 83^b is disengaged from the end of the spline, all combined and operating substantially as described.

18. In a paper-bag machine the combination of the conveyer, the carrier pivotally connected thereto, operating means consisting of a cam to cause the same to be oscillated, the plicators pivotally mounted on oppositely-disposed sides of the carriers and operating means consisting of a cam to cause the same to sweep over the traveling folding-bed of the carrier as the same is carried along by the conveyer.

19. In a paper-bag machine the combination of a cylinder, provided with a mutilation, the carrier pivotally mounted to the cylinder and means for imparting thereto an oscillatory motion, the plicators pivotally mounted in oppositely-disposed sides of the carrier, and operating means consisting of a cam to cause the same to sweep over the surface of the carriers directly back of the creaser-blade substantially as described.

20. In a paper-bag machine the combination of a cylinder, provided with a mutilation, the carrier pivotally mounted to the cylinder and means for imparting thereto an oscillatory motion, the plicators pivotally mounted in oppositely-disposed sides of the carrier, and operating means consisting of a cam to cause the same to sweep over the surface of the carriers directly back of the creaser-blade coacting with the transverse creaser-groove 109 as the carrier is propelled onward by the cylinder.

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