

No. 675,805.

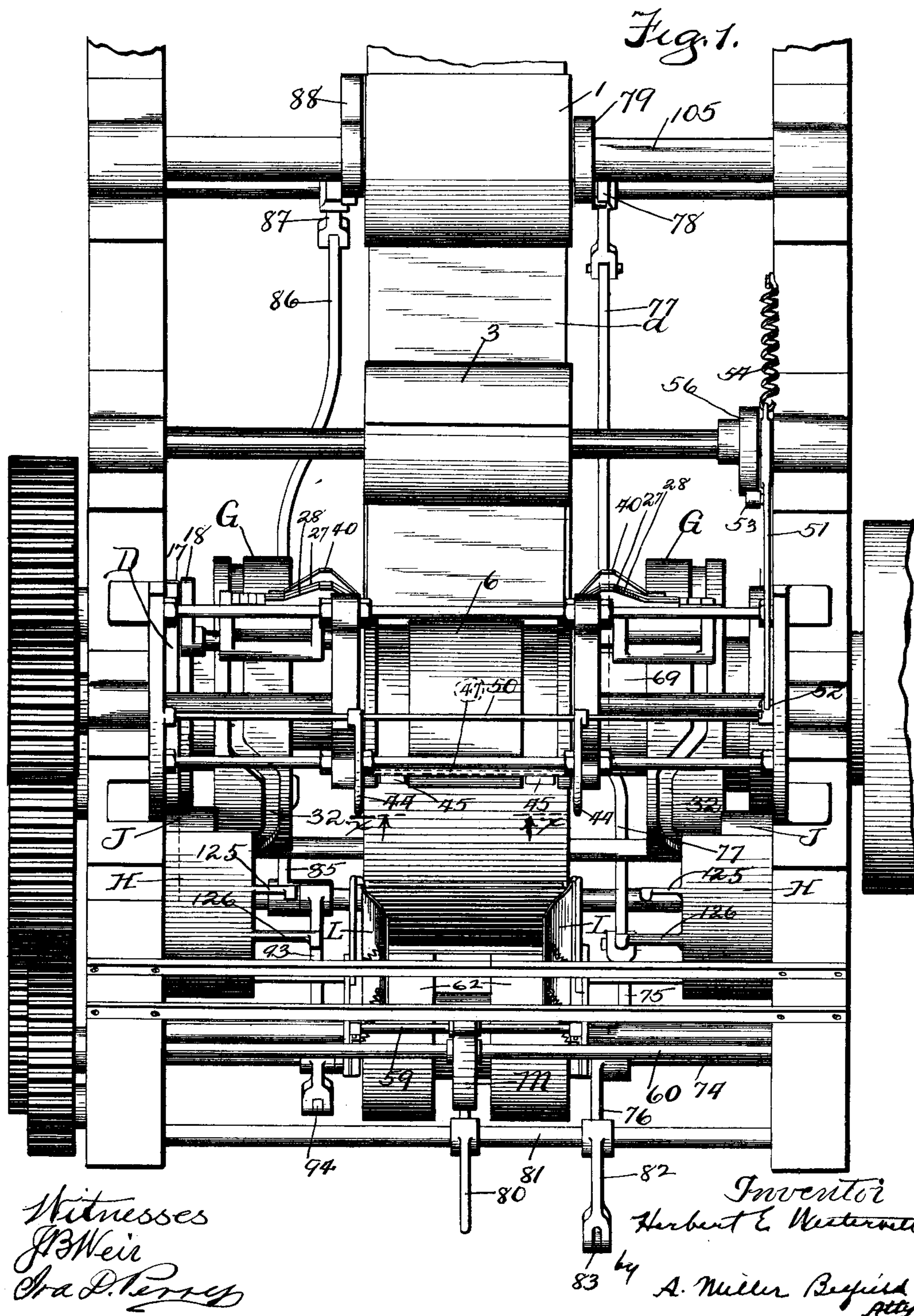
Patented June 4, 1901.

H. E. WESTERVELT.  
PAPER BAG MACHINE.

(Application filed Nov. 24, 1899.)

(No Model.)

6 Sheets—Sheet 1.



No. 675,805.

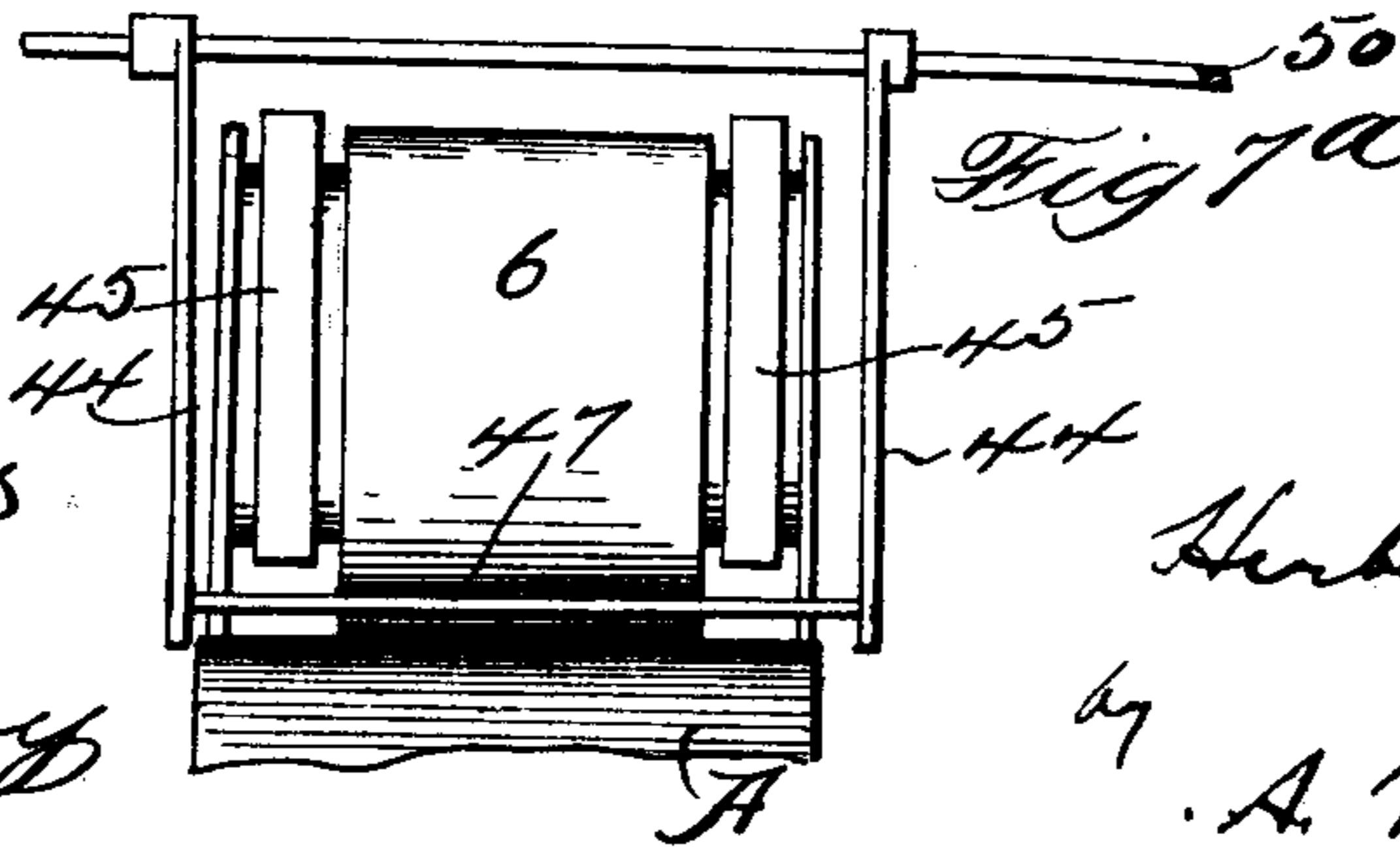
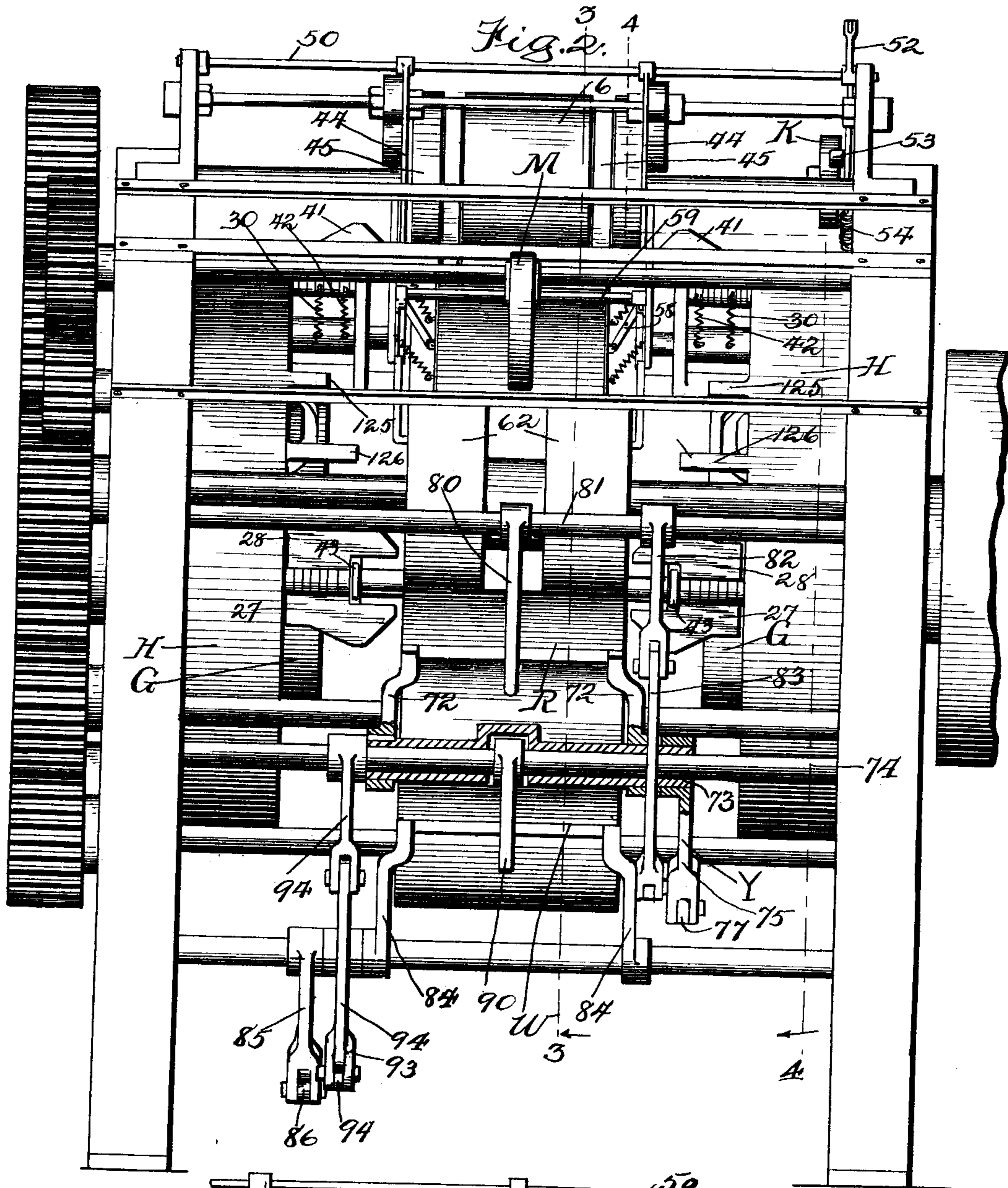
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6 Sheets—Sheet 2.



Witnesses  
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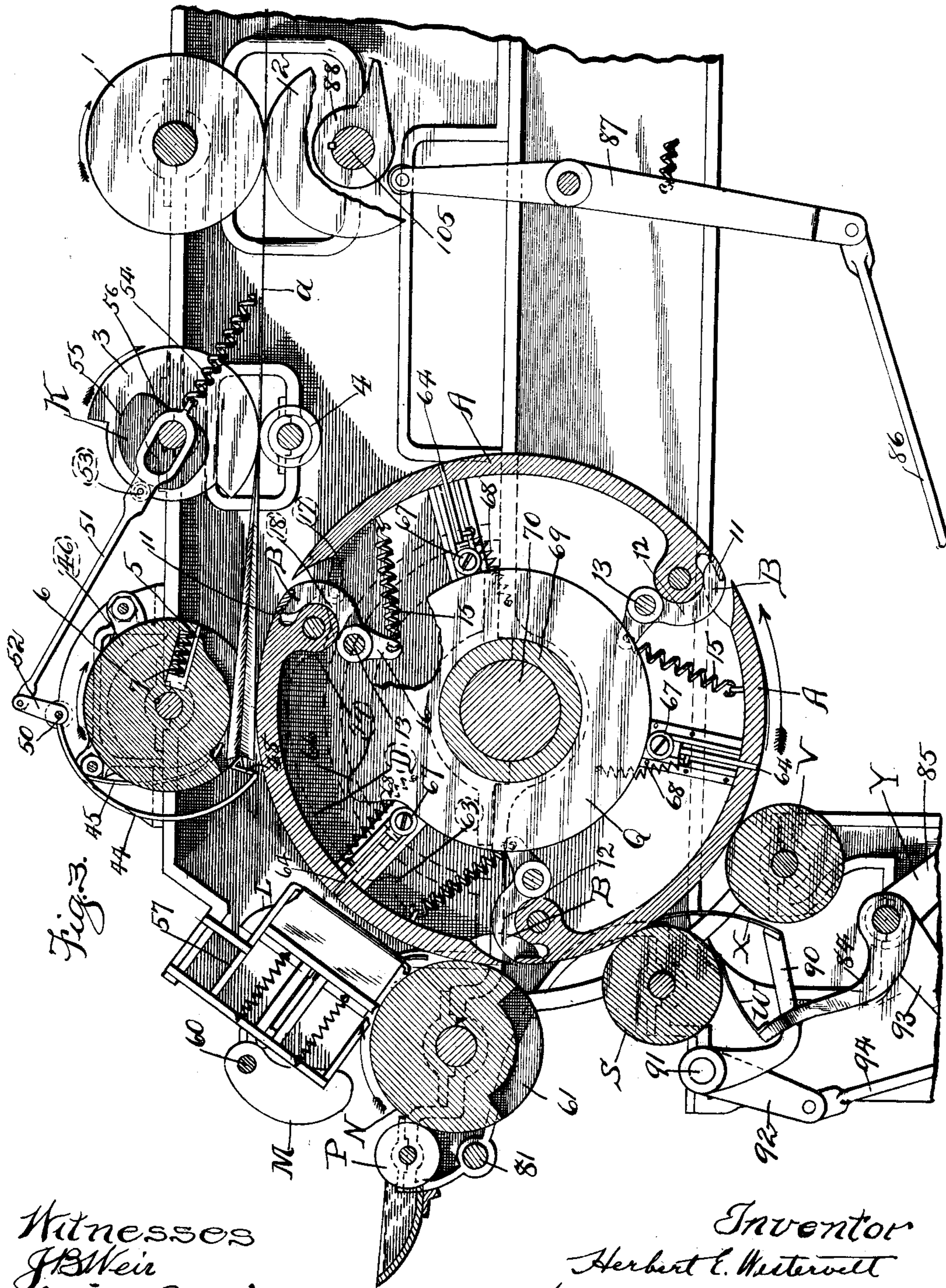
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6 Sheets—Sheet 3.



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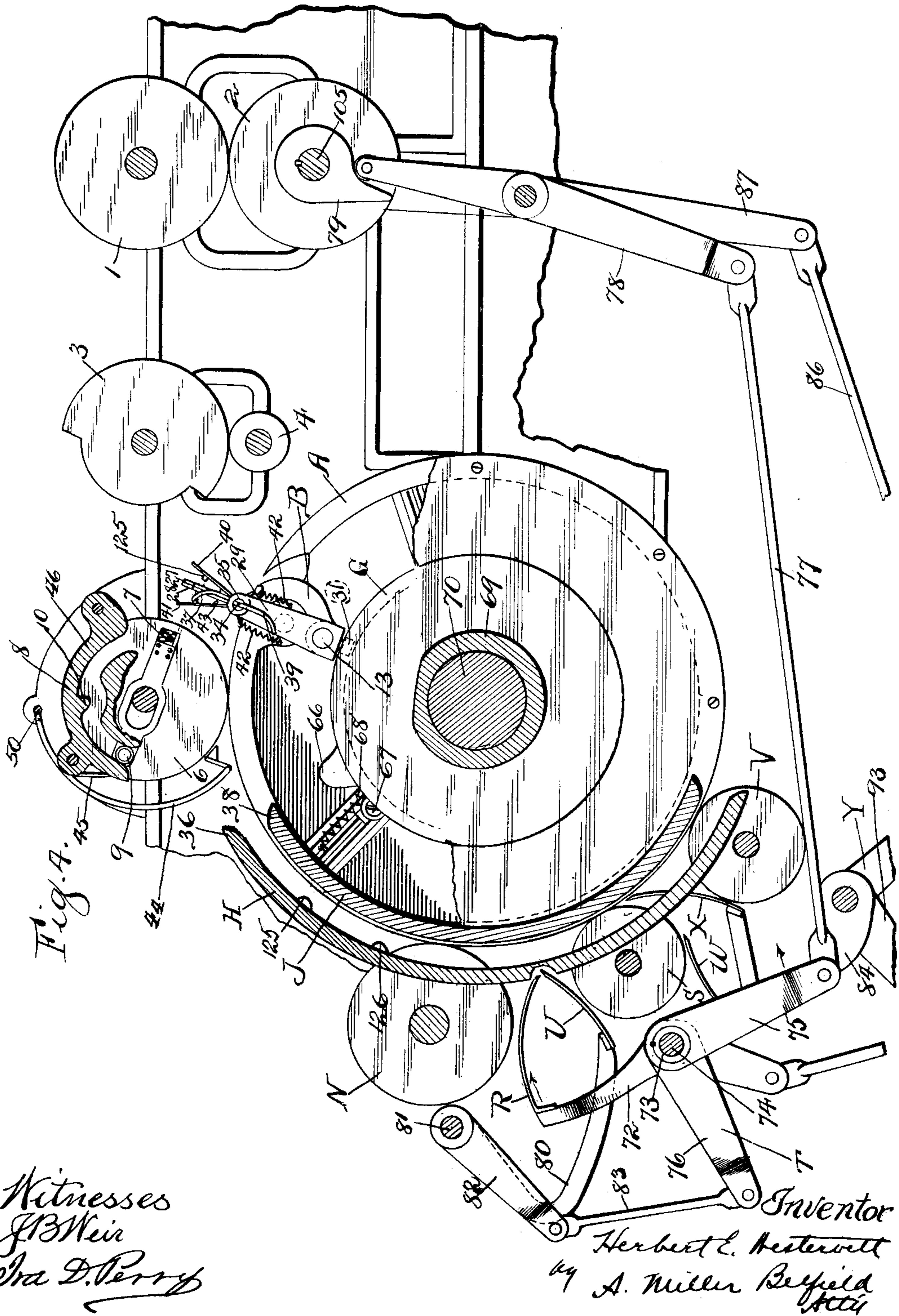
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6 Sheets—Sheet 4.



No. 675,805.

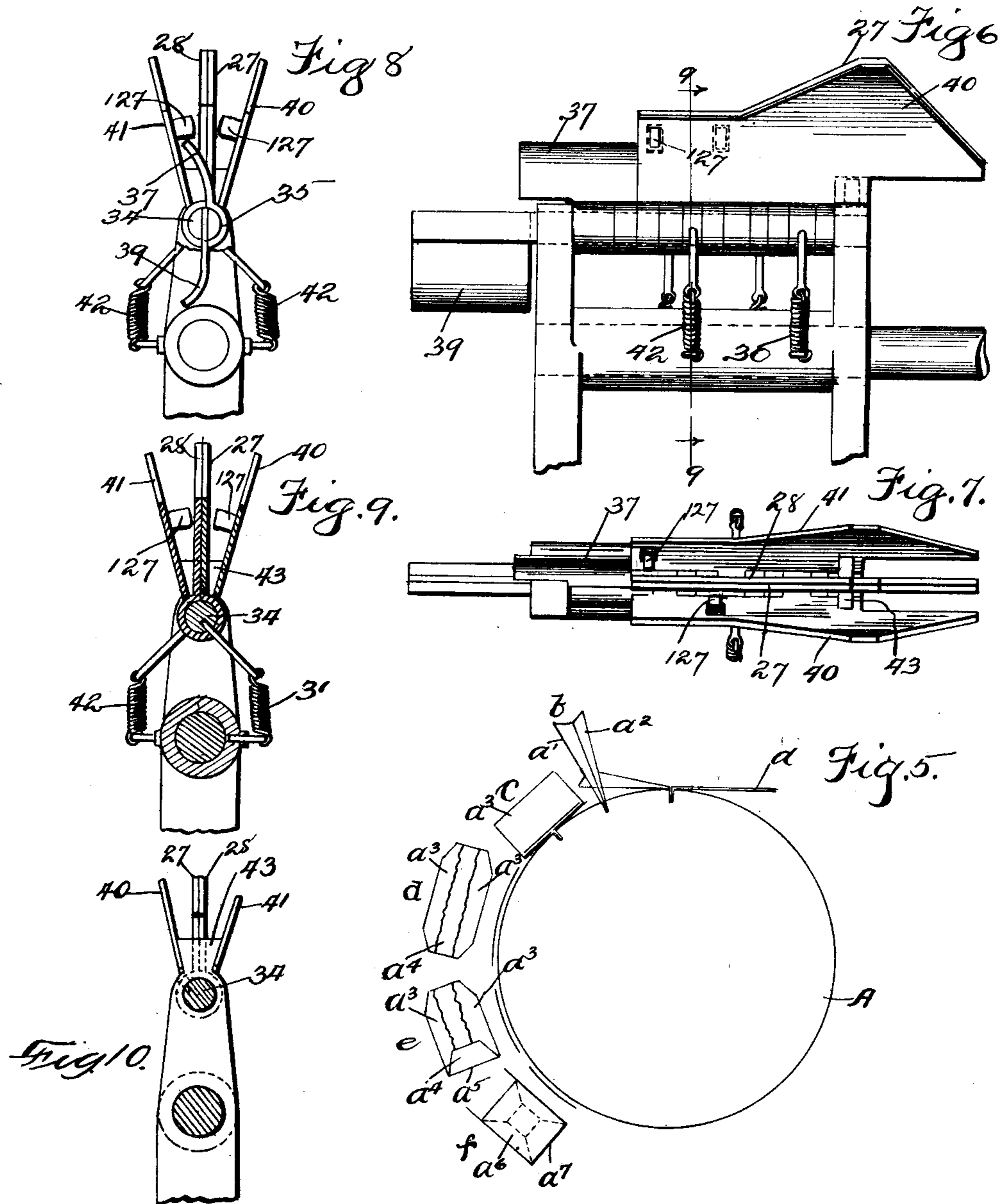
H. E. WESTERVELT.  
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(Application filed Nov. 24, 1899.)

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6 Sheets—Sheet 5.



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6 Sheets—Sheet 6.

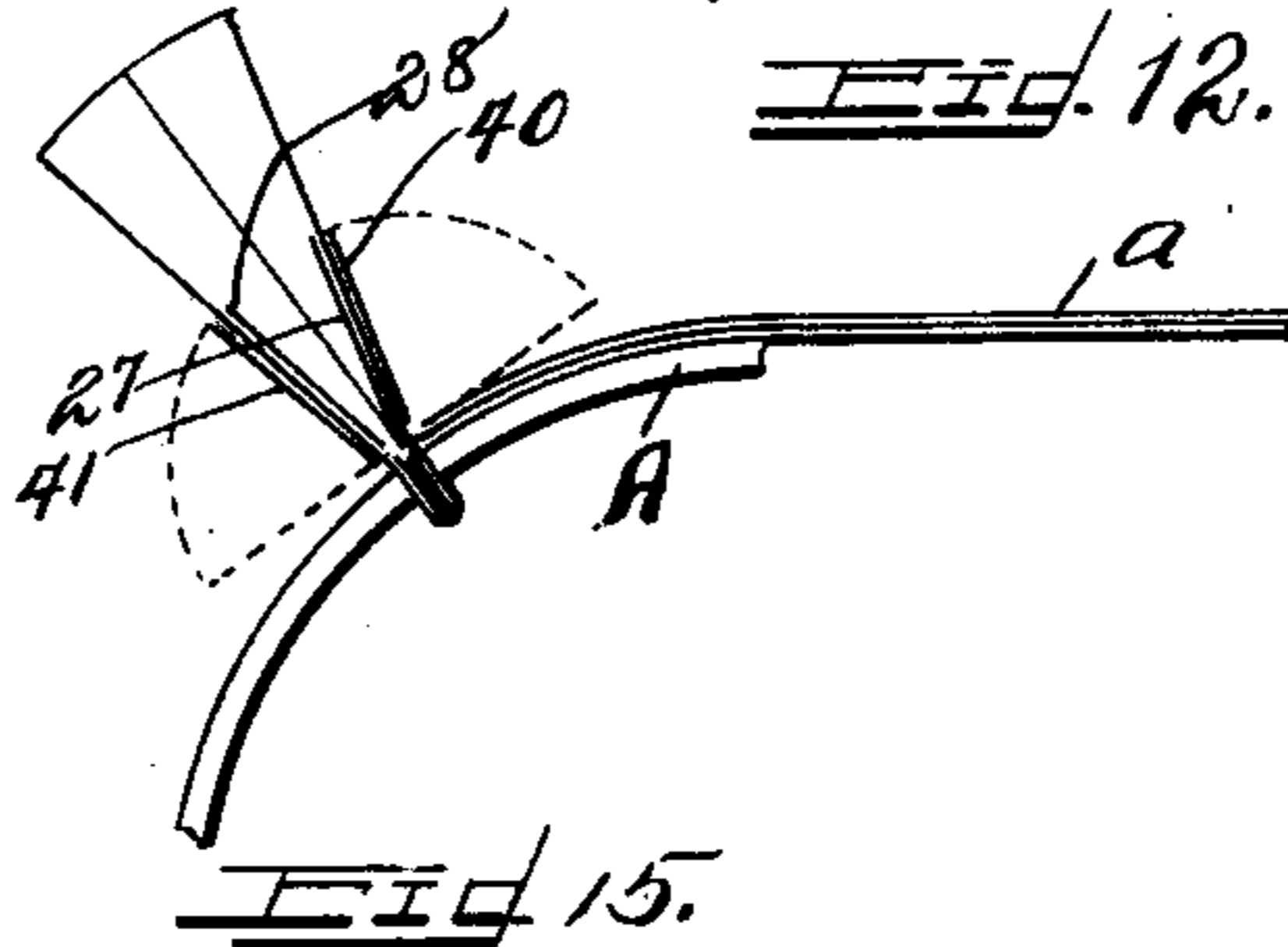
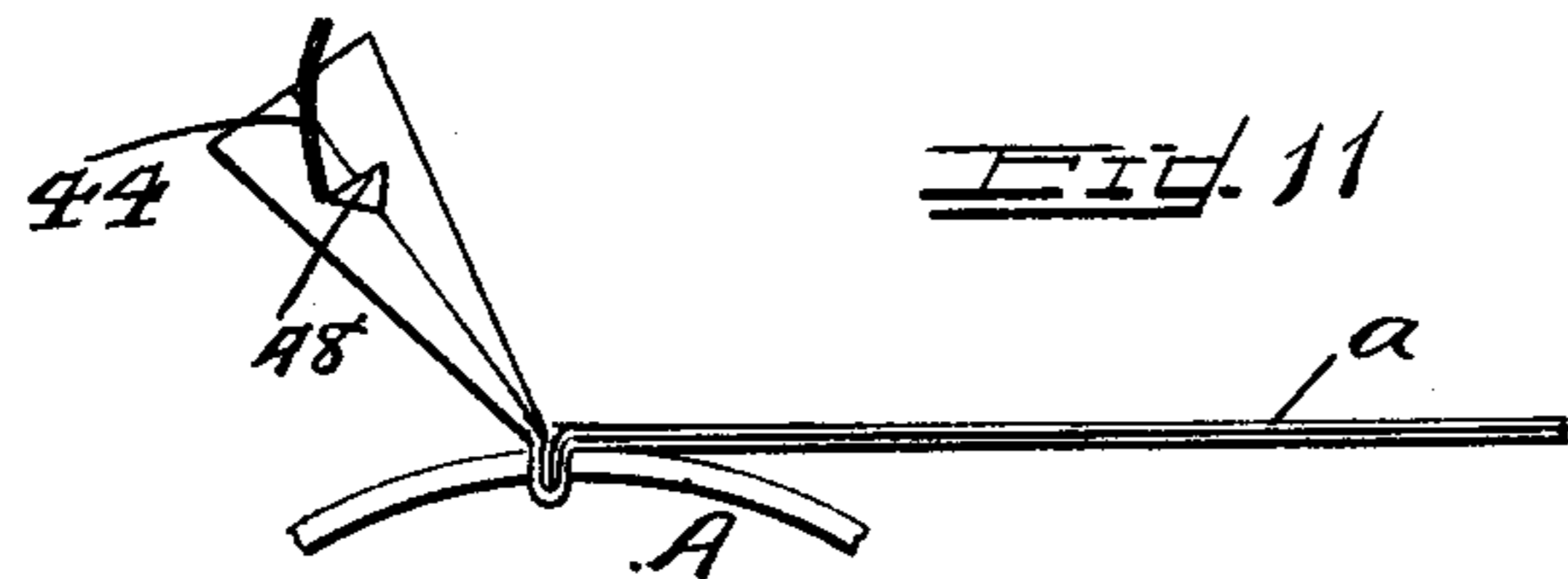


FIG. 15.

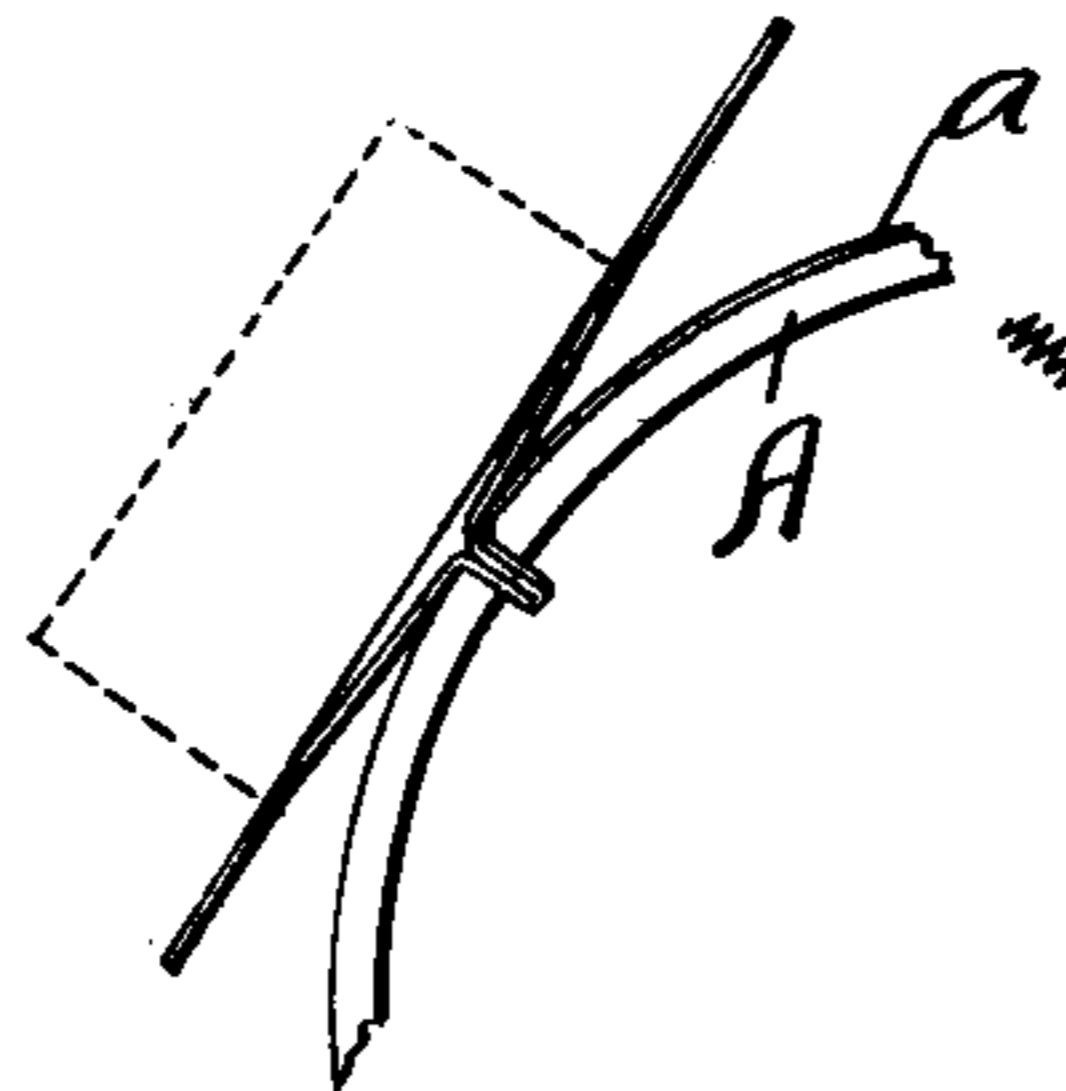


FIG. 16.

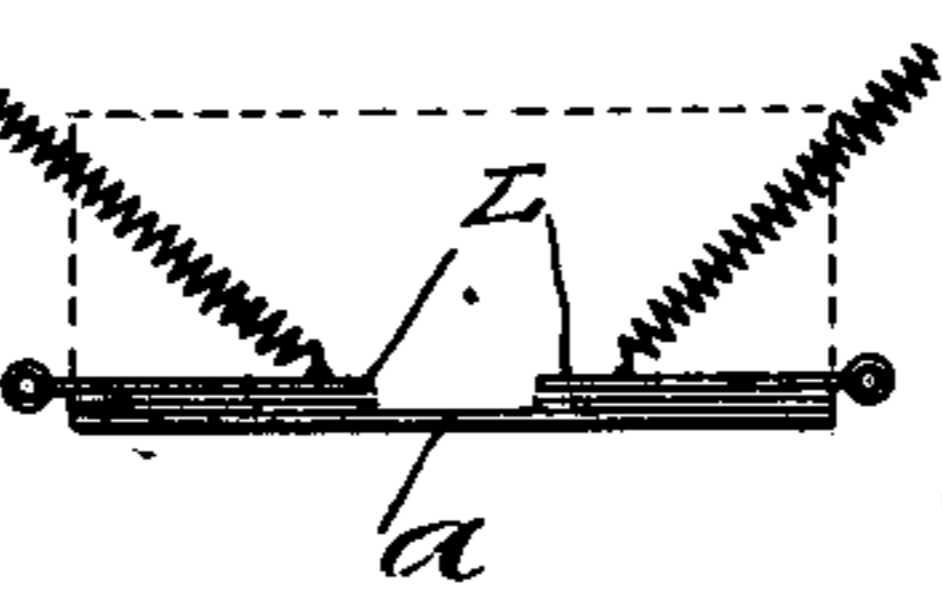


FIG. 17.

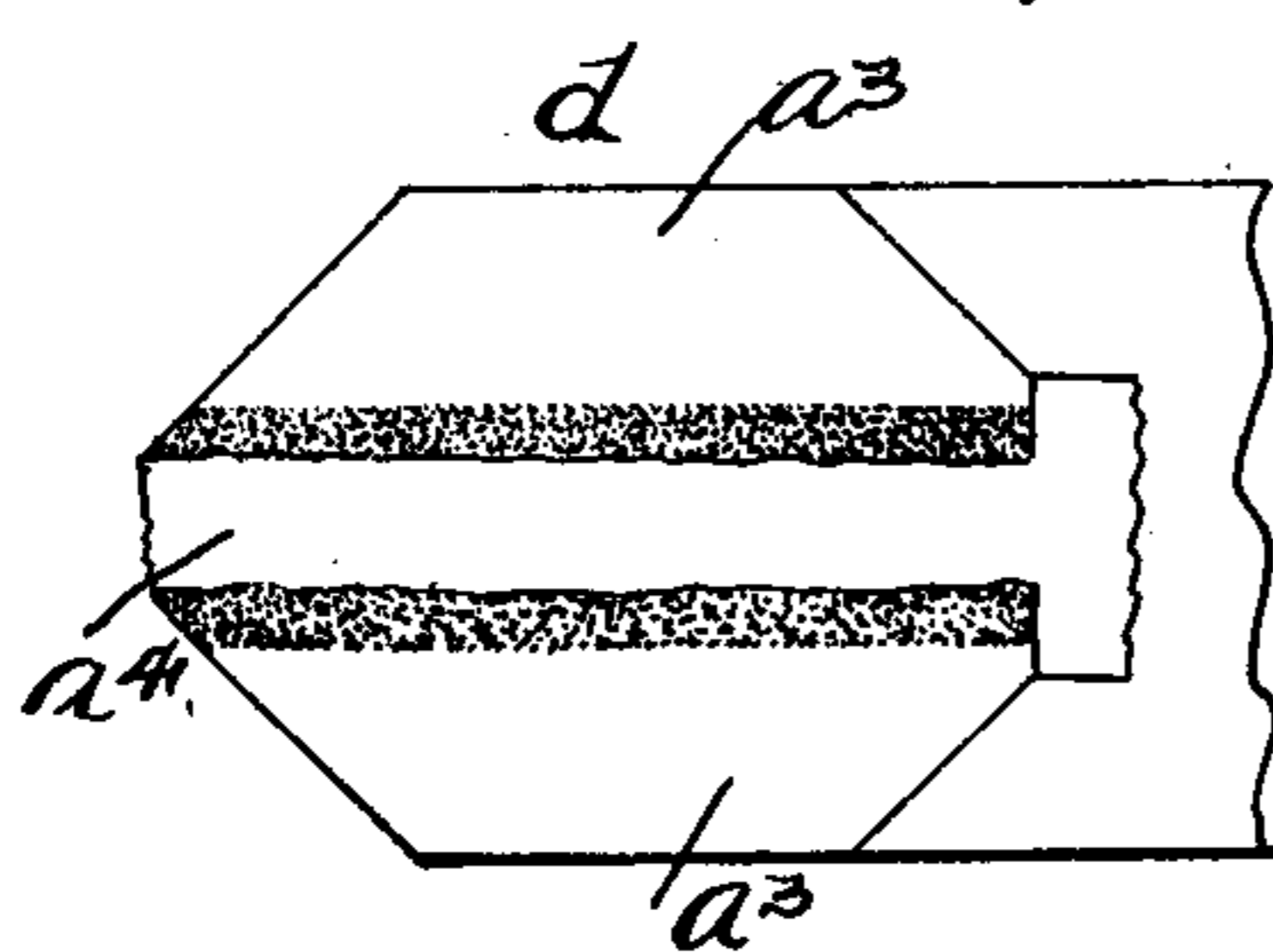


FIG. 20.

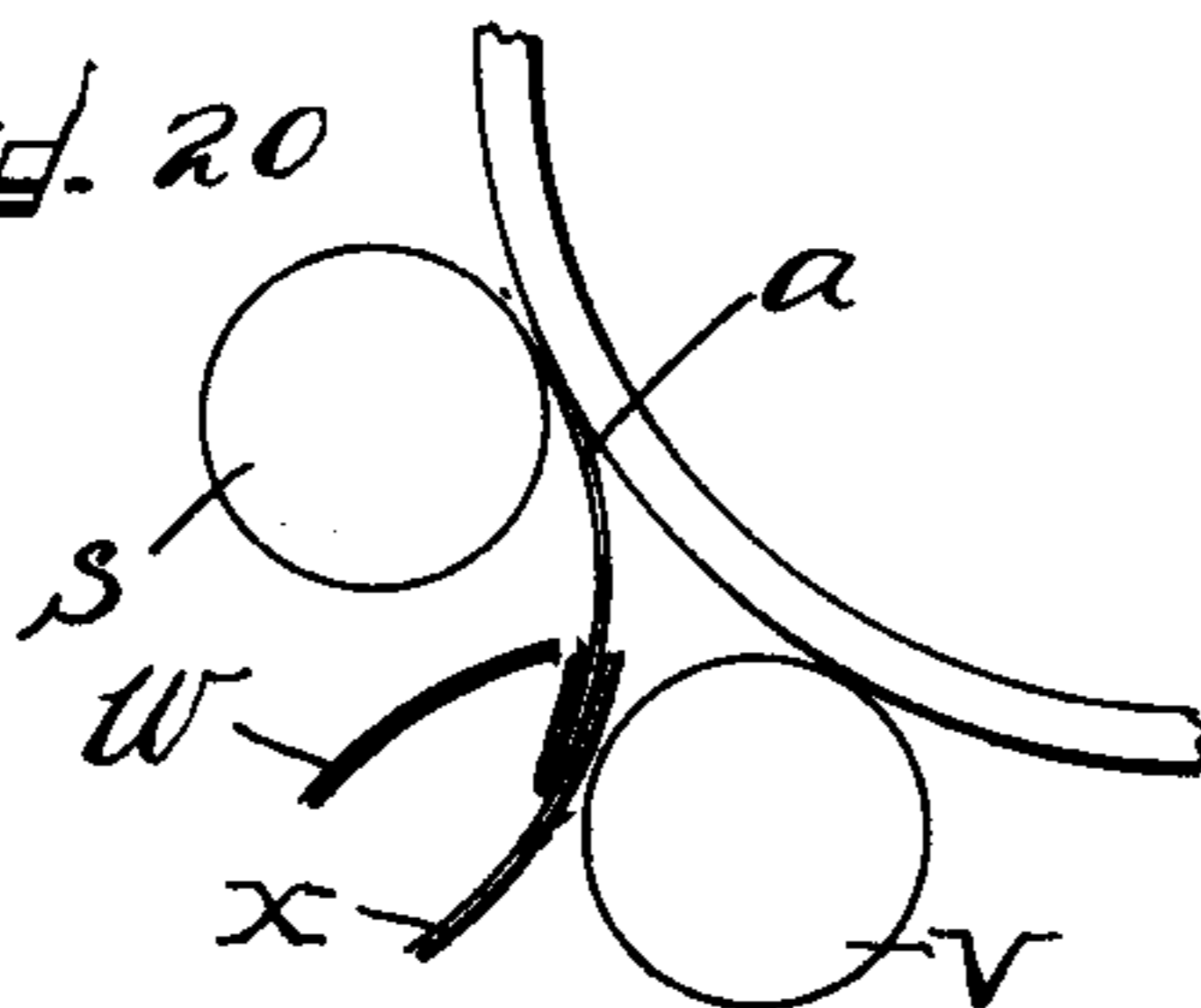


FIG. 21.

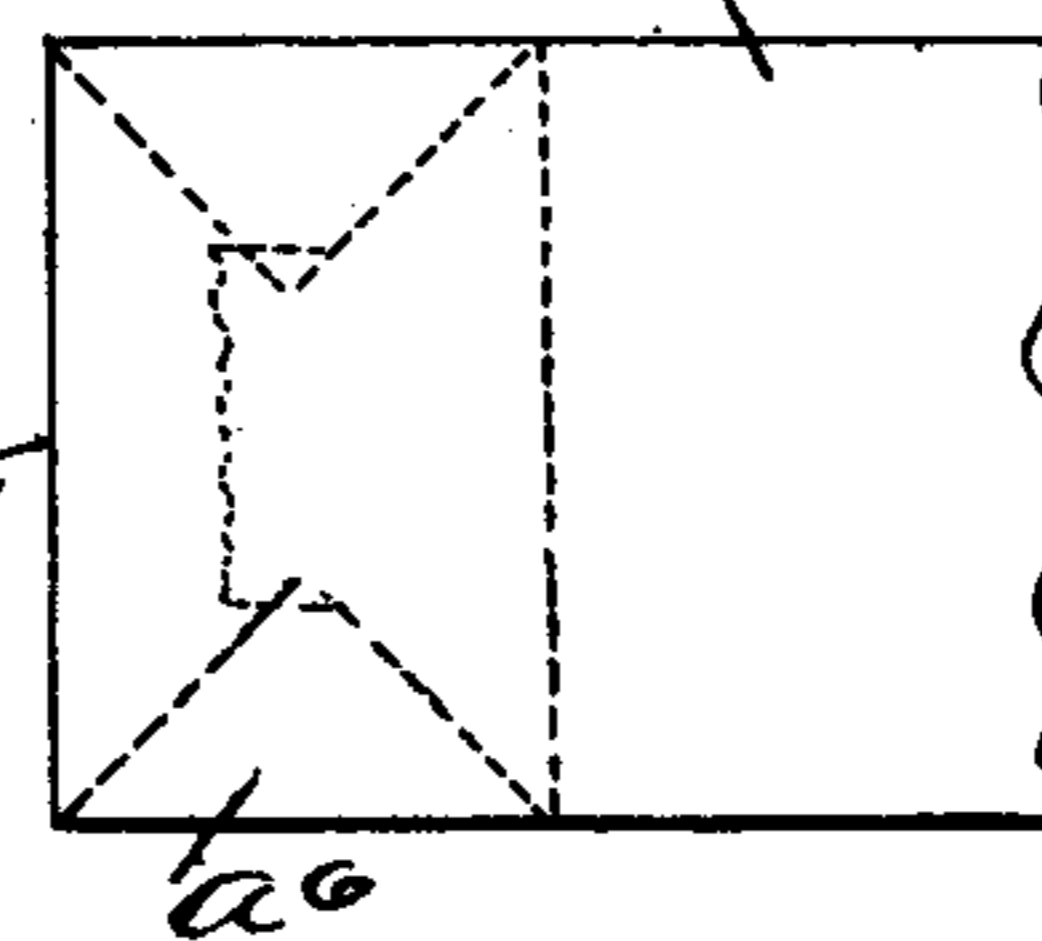


FIG. 13.

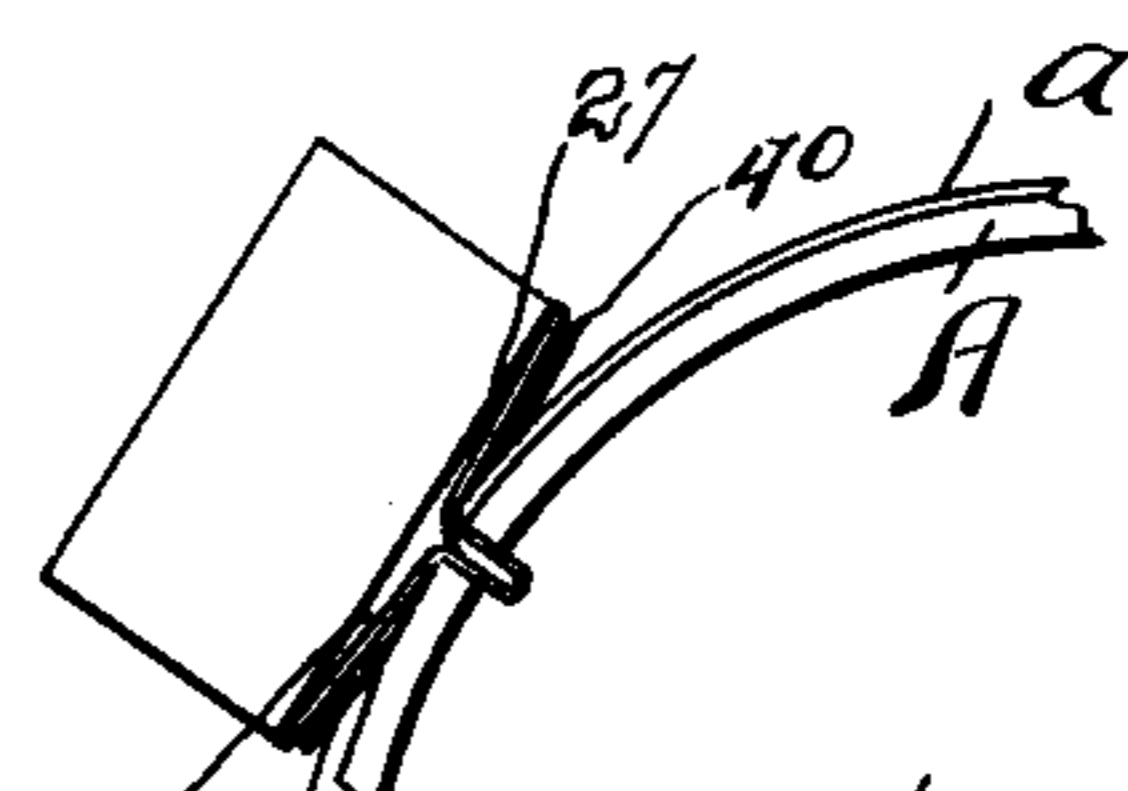


FIG. 14.

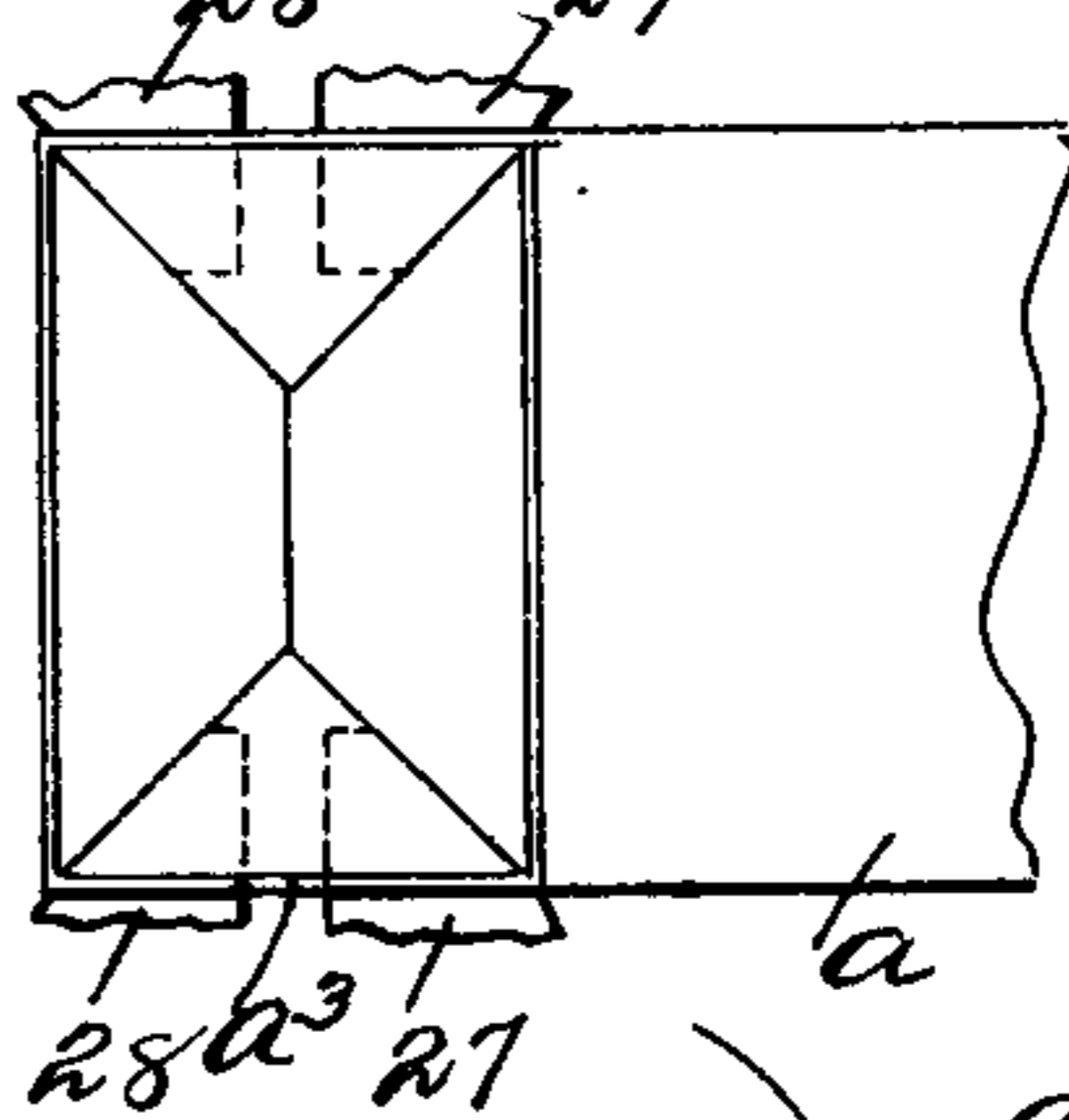


FIG. 18.

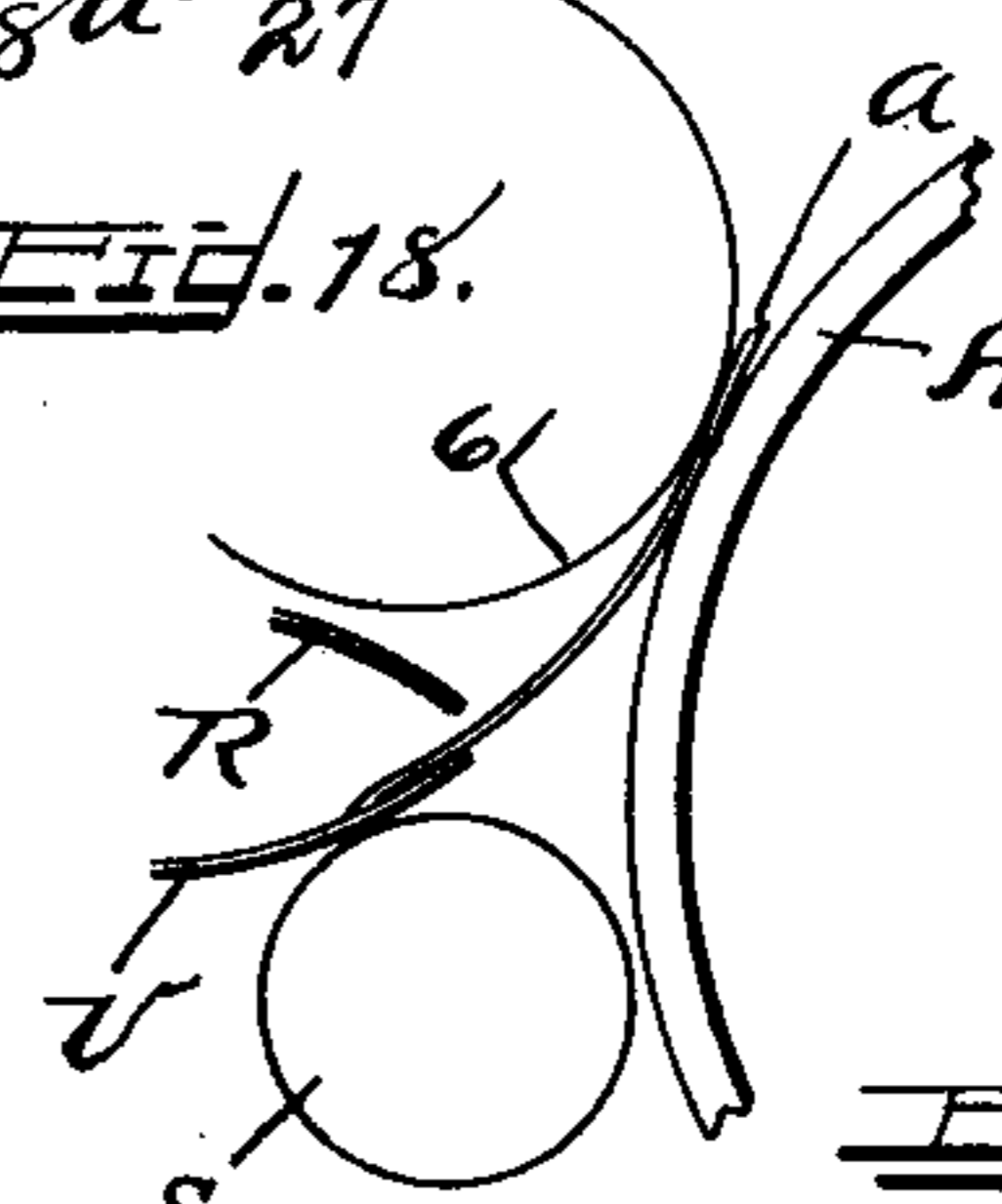


FIG. 19.

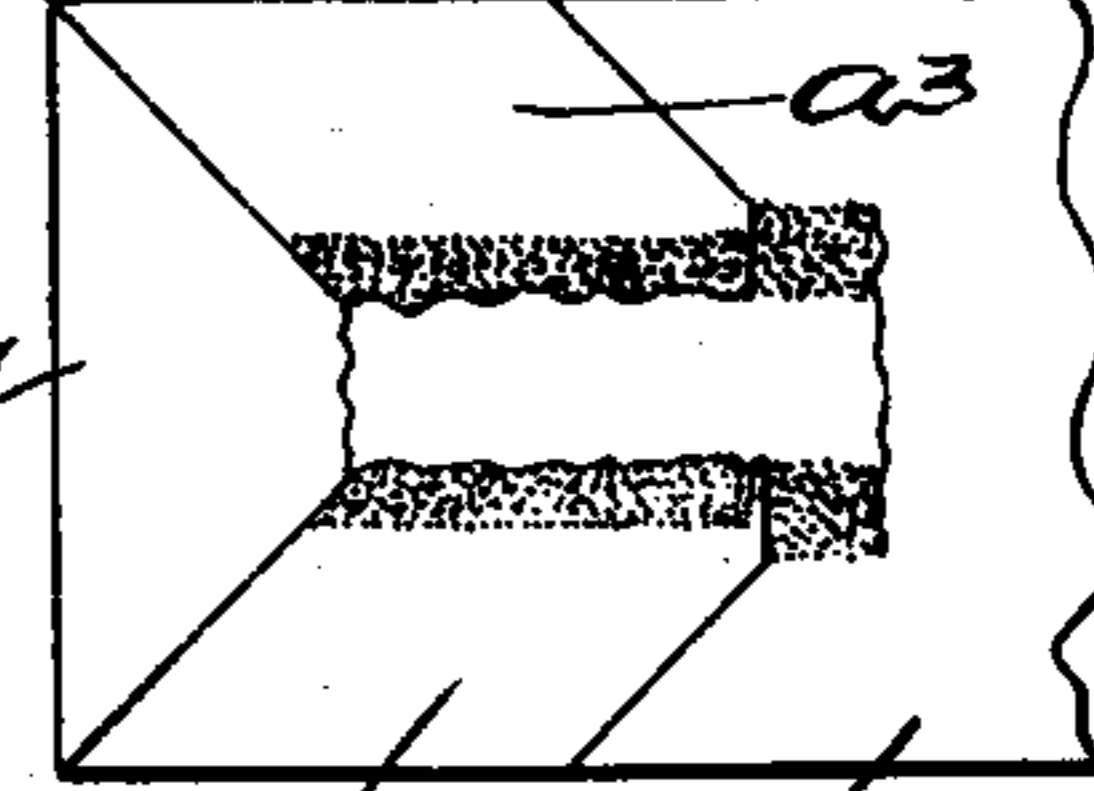
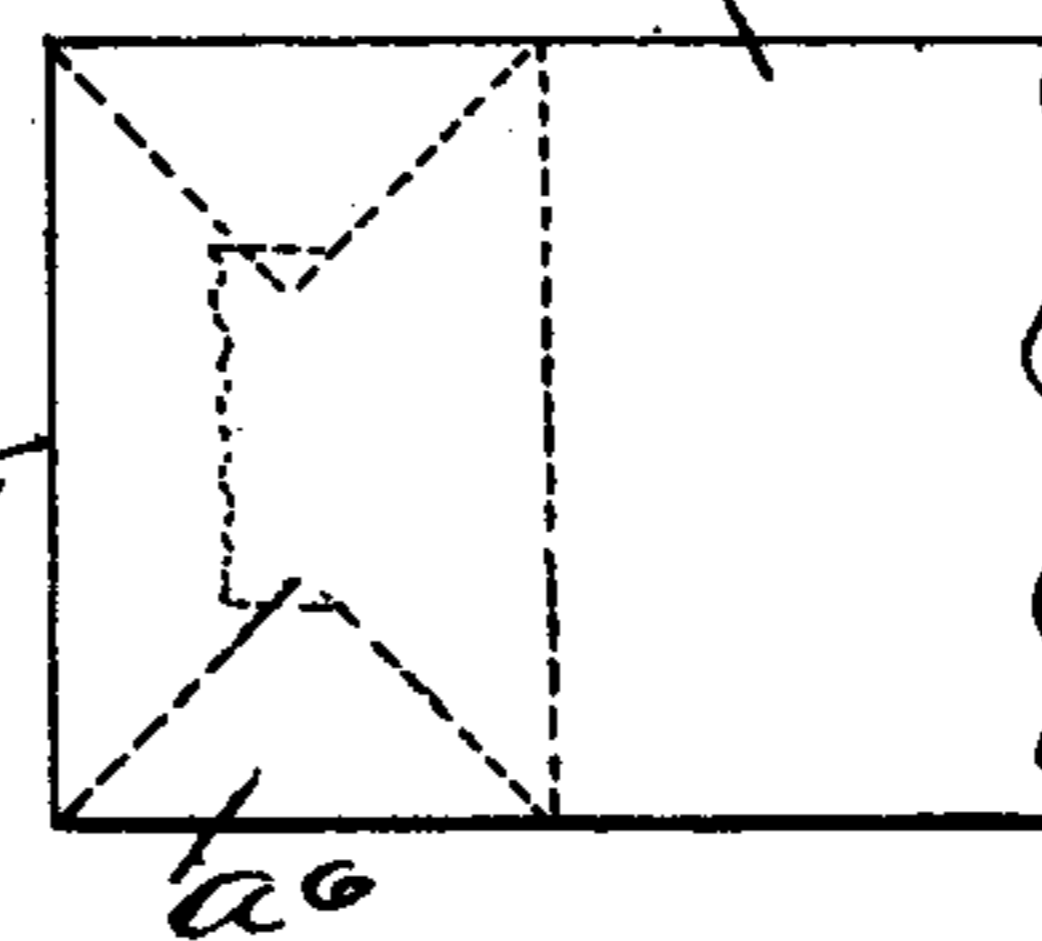


FIG. 21.



WITNESSES

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# UNITED STATES PATENT OFFICE.

HERBERT E. WESTERVELT, OF SOUTH BEND, INDIANA.

## PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 675,805, dated June 4, 1901.

Application filed November 24, 1899. Serial No. 738,144. (No model.)

*To all whom it may concern:*

Be it known that I, HERBERT E. WESTERVELT, a citizen of the United States of America, and a resident of South Bend, county of St. Joseph, and State of Indiana, have invented certain new and useful Improvements in Paper-Bag Machines, of which the following is a specification.

My invention relates in general to machinery for making paper bags of the kind in which the body of the bag consists of a bellows-folded or tucked tube and the bottom of such tube folded into what is commonly known as a "satchel-bottom." My invention relates in particular to the machinery for forming the tucked tube into the satchel-bottom.

The object of the invention is to provide simple, novel, and improved mechanism of this kind.

To the attainment of the foregoing and other desired ends my invention consists in matters hereinafter set forth.

In the accompanying drawings, Figure 1 is a plan view of a machine embodying my invention. Fig. 2 is a front elevation of the same. Figs. 3 and 4 are vertical sections taken in lines 3-3 and 4-4, respectively, in Fig. 2. Fig. 5 is a diagrammatic view illustrating the formation of the diamond-folded bag-bottom. Figs. 6 and 7 are respectively a side elevation and a plan of one of the mechanisms of the machine. Fig. 7<sup>a</sup> is a fragmental view taken on line X-X in Fig. 1. Fig. 8 is an end view of the same. Fig. 9 is a section taken on line 9-9 in Fig. 6, and Fig. 10 is a view of a portion of the opposite end of the same. Figs. 11 to 21, inclusive, are views illustrating the successive operations performed in making the blank into the bag and also illustrating the mechanism by which these successive operations are performed.

The bellows-folded or tucked tube *a* for the bags is made by any suitable mechanism. As such mechanisms are known in the art, and as my present invention does not relate at all to them, I do not show or describe any such mechanism in this application. This tube *a* is automatically advanced between a pair of cutting-rolls 1 and 2, by which it is automatically cut into lengths called "bag-blanks," each of which is the size required to form the completed bag. The rolls 1 and 2 have their cir-

cumferences each equal to the length of the bag-blank, whereby one bag-blank is cut at each revolution of the rollers. At the time the rear end of each blank is cut by the cutting-rolls its forward end has been sufficiently advanced to be engaged by a pair of feed-rolls 3 and 4. These two feed-rolls are gear-connected together, so as to have the same surface speed. The upper roll 3 has a circumference equal to the length of the blank, so that it, like the cutting-rolls 1 and 2, rotates once for each bag-blank fed by it.

The bag-blanks are successively fed to a constantly-rotating cylinder A, which provides for them a folding-bed upon which the bag-bottom is formed and folded. After each bag-blank has reached the cylinder and the portion thereof sufficient to form the bag-bottom has been fed thereupon a small portion of the blank next succeeding is tucked into the cylinder and gripped or caught thereby, so that the portion for the bottom protrudes or extends out of the cylinder. As the cylinder rotates the bag-blank is advanced with it and while being so advanced has such protruding portion operated upon so as to form the diamond-folded bag-blank. The various operations by which the bag is formed occur as the blank advances somewhat less than a half-revolution from the point where it has been engaged or gripped, and at the end of this advancement the blank drops from the cylinder as a completed bag.

In order to make more clear the various operations incident to the formation of the bag and the mechanism for forming the same, I shall refer first to Fig. 5, which shows the different steps in the formation of the bottom and the positions of the bag-blank at the times these various steps occur. In this figure the blank is shown in position *b* as engaged or gripped by the cylinder in the manner referred to. In such cases the forward portion of the blank—that is to say, the portion which is to form the bag-bottom—is free to extend outwardly and upwardly from the cylinder. In position *c* the two plies *a'* and *a''* of this free portion have been engaged on both sides of the blank at points between the cylinder and their ends and swung downwardly to the cylinder, the front ply *a'* in a forward direction and the rear ply *a''* in a rearward direc-

tion, so that the portion of the blank above or outside of the points of engagement forms a box-like structure, having such points of engagement at its corners. In position *d* the sides  $a^3$  of the box-like structure have been folded downwardly and inwardly, so as to form the diamond fold illustrated by the supplementary figure at this position, which figure is a plan view of the blank as it lies upon the cylinder. In position *e* the forward portion  $a^4$  of this diamond fold has been turned back and superposed upon the next rear portion thereof. This forms the forward crease  $a^5$  and is commonly known as the "first fold" of the bottom. In position *f* the portion  $a^6$  of the bag fold and the underlying portion of the body of the bag is turned or doubled back and superposed upon the body of the blank. This forms the rear crease  $a^7$  of the bag-bottom and is commonly known as the "second or blind fold," the two lapping end portions of the diamond fold being turned underneath, so as to lie between the bottom and the body of the blank. After the blank has been formed into the diamond fold of position *d* the engaged or gripped portion is released by the cylinder and withdrawn therefrom. It will be understood that after the blank has been formed into the diamond fold of position *d* the paste is applied to the inner edges of the sides  $a^3$ , as is commonly done.

The bag-blanks are tucked into the cylinder by a tucking-blade 5, carried by a tucking-roll 6, mounted above the cylinder, Fig. 4. The tucking-roll is of such diameter that it rotates once for each bag-blank, and the tucking-blade 5 is associated with the mechanism by which it is automatically projected from the roll as the latter turns, so as to bring it into position opposite the cylinder. The mechanism shown for thus operating the blade comprises a spring 7, Figs. 3 and 4, tending to normally hold the blade in a retracted position within the roll, and cams 8 8, engaging the wheels 9 9, which are carried by extensions of the blade 5. The cams 8 8 are provided with projections 10 10, which cause the projection of the blade 5 at the proper time. These cams 8 8 are mounted at the opposite ends of the roll 6. The bag-blank is engaged or gripped by the cylinder, in the manner described, by one of three gripping devices B B with which the cylinder is provided. The form of gripping device shown comprises a gripping-blade 11, carried by a couple of arms 12 12, which are arranged within the cylinder and mounted upon a rock-shaft 13, carried thereby. The arms 12 12 are held normally in position to close the blade 11 against the abutting portion of the cylinder by a spring 15, attached to an arm 16 on the rock-shaft. They are swung rearwardly so as to open the gripper when the latter comes opposite the tucking-roll 6 by a circular cam D, arranged at the left-hand side of the cylinder, as shown in Fig. 1. The swinging of the arms 12 12 by this cam D results from the engagement of a

roll 17 on a rocker-arm 18 on the rock-shaft 13 with an inwardly-extending projection 19 on the cam. When the roller 17 strikes the projection 19, it is retarded, and the arms 12 12 thereby swung back. When the roller rolls down from the projection 19, it allows the spring 15 to swing the arms 12 12 forwardly, and thereby close the gripper.

The cylinder A and tucking-roll 6 are gear-connected together, so that the tucking-blade 5 in a projected position meets the gripping devices as the latter in succession reach the meeting-point of the roll and the cylinder, and the projection 19 on the cam D is situated so as to cause each gripper to be opened and receive the portion of the blank tucked by the tucking-blade and to close immediately after the withdrawal of such blade. The roll 6, carrying the tucking-blade, is cut away or mutilated, as shown in Fig. 3, so as to allow the forward portion of the blank to advance in its natural fluffy or partially open condition. The portion of the bag-blank projecting outwardly from the cylinder A, as shown in position *b* in Fig. 5, now has its two plies  $a'$  and  $a^2$  engaged and swung downwardly in opposite directions, so as to form the box-like structure shown at position *c* in said figure. This is done by a couple of tuck-entering and ply-folding mechanisms, which are carried on opposite sides of the cylinder and are arranged to enter the two tucks of the opposite sides of the blank and depress or fold down the two sets of plies thereof as the cylinder advances. The mechanism shown comprises two sets of blades 27 27 and 28 28, Figs. 4, 12, 13, and 14, one set, 27 and 28, arranged on each side of the cylinder. As the action of these two mechanisms on the opposite sides of the cylinder is the same, I will describe but one of them. The blades 27 and 28 are normally in a substantially radial position, as shown in Fig. 4, and are also in a position away from the side of the cylinder, as shown in Fig. 1. After the blank has been gripped by the gripper carried by the cylinder, however, the blades 27 and 28 are advanced inwardly or toward the cylinder, so as to enter the tuck of the bag-blank, and after being so advanced are swung downwardly, the rear blade 27 in a rearward direction and the forward blade 28 in a forward direction. This downward-swinging motion of the blades serves to fold the plies into the said box-like structure.

In order to permit the inward movement of the blades to enter the tuck, they are mounted upon a sliding carriage 29, which is carried by the cylinder, and engaged to slide in a transverse direction relatively thereto. The proper inner movement of this carriage is produced by an annular cam G and a roller 31 on the carriage 29, adapted to engage the cam G. The cam G is provided with an inwardly-extending portion 32, which causes the carriage 29 to move inwardly when the roller 31 moves against it. In order to permit the downward-swinging movement of

the two blades 27 and 28, they are pivotally mounted upon the carriage 29, a simple way being to mount the forward blade 28 upon a rotary spindle 34 and the rear blade 27 upon a rotary sleeve 35, inclosing the spindle 34. These blades 27 and 28 are subject to springs 30 30, tending to hold them normally in radial positions. The rear blade 27 is swung downwardly by an annular cam H, which is arranged to one side of the cylinder A. The rear end 36 of this cam H is positioned so as to strike a rear extension 37 on the blade 27 and by lowering said extension 37 as the cylinder advances to lower the blade 27 correspondingly. The forward blade 28 is lowered by a similar annular cam J, which is arranged substantially within the cam H. The rear end 38 of this cam J is positioned so as to strike an arm 39, depending from the spindle 34. The arm 39 is on the side of the spindle 34 opposite the blade 28, whereby when the arm 39 is swung rearwardly by striking the front end 38 of the cam J the blade 28 will be swung forwardly. The plies of the bag-blank are caught or engaged during the downward movement of the blades 27 and 28 by nippers 40 and 41. These nippers 40 and 41 are pivotally connected with the blades 27 and 28, respectively, and are subject to springs 42 42, tending to force them upwardly against the blades 27 and 28. They are held normally at a slight distance away from such blades, however, by a plate or stop 43, Fig. 10, on the carriage 29. This slight separation of the nippers from the blades allows the latter to enter the tuck properly, while the nippers enter, respectively, in front of and behind the blank. After the blades have so entered, however, and have begun to swing downwardly they reach the nippers 40 and 41 and force them downwardly also with the plies of the blank between the respective pairs of cooperating blades and nippers.

The nippers 40 and 41 are temporarily released from engagement with the plies of the bag-blank, so as to prevent tearing the paper at the time the carriage is moved outwardly. This is done by depressing the nippers at this time. As an arrangement for such depression the upper cams H H are provided with ribs or projections 125 125 and 126 126, which are adapted to cooperate with projections 127 127 on the nippers. The foremost projections 126 126 engage the projections 127 127 on the two forward nippers 41 41, and the two rear projections 125 125 engage the projections 127 127 on the rear nippers. The blades 27 and 28 are provided with apertures through which the projections 127 127 can extend.

In order to insure the proper entrance of the ply-turning devices into the tucks of the bag-blank, I arrange devices for holding the plies in a proper separated condition at the time such ply-turning devices enter the tucks. The holding devices shown comprise a couple of sets of arms 44 44 and 45 45, each set 44

and 45 being arranged on each side of the bag-blank, Figs. 3, 4, and 11. The arms 45 45 are normally in such position that the bag-blank slides below their lower ends, as shown in Fig. 3. These arms are arranged in grooves 46 46 in the tucking-roll 6. The arms 44 44 have their lower ends connected by a blade 47, Fig. 7<sup>a</sup>, over which the lower ply of the bag-blank passes. This arrangement holds the two plies of the bag-blank from unduly separating from one another. They are held in a proper separated position by fingers 48 48, which are secured to the arms 44 44 and extend around the edge of the lower ply of the blank, so as to enter the tuck thereof. As the blank advances, the upper ply passes below the upper arms 45 45, the lower ply passes above the blade 47, and the two plies with adjoining tuck-plies pass, respectively, above and below the fingers 48 48. The blank is engaged in this way while it is being tucked into and engaged by the gripping devices of the cylinder. After it has been so tucked and engaged the arms 44 44 and 45 45 are swung upwardly and forwardly, so as to allow the forward end of the blank to proceed and at the same time to hold its plies in proper separated condition. When in this position, the folding-blades 27 27 and 28 28 enter the two tucks. After these blades have so entered the arms are swung still farther up, so as to become disengaged from the blank. These movements of the arms 44 44 and 45 45 first slightly upward and then still farther upward are arranged for by securing the arms 45 45 to the arms 44 44 and attaching the latter to a rock-shaft 50, which is arranged above the tucking-roll 6. This rock-shaft 50 is properly rocked by a link 51, connected with a rocker-arm 52 on the rock-shaft 50 and provided with a roller 53, which is acted upon by a cam K on the upper feed-roll 3. The link 51 is subjected to a spring 54, tending to draw it in a rearward direction. The cam K is provided with a circular surface 55, which forces the link 51 forwardly, and thereby holds the arms 44 44 and 45 45 in a lowered position, and it is also provided with a retreating surface 56, which allows the spring 54 to draw the link 51 rearwardly, and thereby swing the arms in a proper manner. The sides *a*<sup>3</sup> of the box-like structure into which the end portion of the bag-blank has been formed, Fig. 5, are now bent or folded downwardly and inwardly, so as to make the diamond fold illustrated in position *d* in Fig. 5. This is done by a couple of swinging wings L L, Figs. 1, 2, and 3, which are arranged on opposite sides of the cylinder and are depressed so as to fold the sides of the bag inwardly as the same proceed beneath them, Figs. 15 and 16. These wings L L are conveniently supported by vertically-arranged supports 57 57, to whose lower ends they are pivotally connected. The simultaneous downward movement of the two wings is arranged for by pivotally connect-

ing arms 58 58, Fig. 2, to the two wings and attaching a horizontal bar or rod 59 to the upper ends of these two arms 58 58, in which way the depression of the bar 59 will cause the simultaneous and corresponding downward swing of the wings L L. The bar 59 is depressed by a rotary cam M, mounted upon a shaft 60. The cam M is constructed so as to depress the bar 59 and allow the same to rise at the proper time. After the bag-bottom has been thus formed into the diamond fold of position *d* it is properly pressed and paste applied in the usual way, Fig. 17, by the pressing and pasting roll N. This roll is constructed with a mutilated portion 61, which allows the forward tube of the diamond fold to proceed without being acted upon by the roll, in which way the blank is not pushed or jammed out of shape. The roll is constructed with two pressing portions 62 62, which act upon the blank in the two places between its two outer edges and the inner edges of the two tucks. Paste is applied to the roll N by a well-known fountain-roll P, Fig. 3, and is in turn applied by the latter to the diamond fold in the well-known way. Immediately after the engagement of the prow portion of the diamond fold by the folding-roll N the gripper holding the bag-blank to the cylinder is automatically opened and the portion of the blank tucked therein is automatically withdrawn. The opening of the gripper is accomplished by a slight projecting portion 63 on the cam D, which portion causes the arms 12 12 of the gripper to swing backwardly. When the gripper is so opened, the tucked portion of the blank is automatically withdrawn therefrom by a slide 64, Fig. 3, arranged to work in and out of the cylinder. This slide is projected at the proper time by a cam Q, having a projection 66, adapted to coöperate with the roller 67 on the lower end of the slide. The slide 64 is held normally within the cylinder by a spring 68. It is provided with suitable guideways, which allow it to work properly back and forth. The cam Q is secured firmly to a stationary sleeve 69, which incloses the shaft 70, which carries the cylinder A. The prow portion *a*<sup>4</sup> of the diamond fold is now doubled back, as shown in position *e* of Fig. 5. This is done by a folding-roll S and a descending blade R, Fig. 4, which latter is adapted to descend and tuck the diamond fold between the roll S and the cylinder, Fig. 18, with the prow portion thereof doubled back over the remaining portion of the fold, as shown in position *e* of Fig. 5 and also in Fig. 10. This descending blade R is carried by a couple of swinging arms 72 72, which are attached to a sleeve 73, loose on the shaft 74. The sleeve 73 carries also a bell-crank T, whose lower arm 75 is arranged substantially in alinement with the arms 72 72 and whose other arm, 76, extends laterally thereto. The lower bell-crank arm 75 is pivotally connected to a link 77, which is in turn pivotally connected to a

swinging lever 78. The latter is rocked or swung by a cam 79, carried by the lower cutting-roll 2. By such arrangement the cam 79 will swing the lever 78 and the latter will in turn swing the swinging arms 72 72, by means of a link 77 and the bell-crank arm 75, and thereby cause the tucking-blade R to descend at the proper time and tuck the blank between the roll S and the cylinder. In order to insure the proper action of the tucking-blade R, the diamond fold is led from the surface of the cylinder A and outward into position below said blade R. This is done by means of a swinging leading-blade U, which is arranged to be positioned in close proximity to the cylinder, so as to lead the blank therefrom and then to be withdrawn so as to allow the descent of the tucking-blade R after the blank has been suitably led. As a simple arrangement the blade U is carried by swinging arms 80 80 on the shaft 81, which also carries an arm 82. The arm 82 is connected to the bell-crank arm 74 by means of a link 83. By such arrangement when the bell-crank T is swung so as to depress the tucking-blade R and then withdraw that blade the leading-blade U will be moved in a direction away from the cylinder as the tucking-blade descends, so as to allow the latter to clear it, and then will be moved in a direction toward the cylinder as the tucking-blade is elevated, so as to prepare it (the leading-blade) for the next oncoming blank.

The final folding of the diamond fold to complete the bag-bottom, as shown in position *f* in Fig. 5, is accomplished by mechanism similar to that just described for making the first fold. This mechanism comprises a folding-roll V, a tucking-blade W, and a leading-blade X, the two latter being carried and operated by mechanisms similar to those operating the tucking and leading blades R and U, respectively. The tucking-blade W is carried by swinging arms 84 84, which are rigidly connected with a bell-crank Y. The lower arm 85 of this bell-crank is operated by a link 86, which is pivotally connected to a lever 87, which latter is operated by a cam 88 on the shaft carrying the lower cutting-roll 2. The leading-blade X is carried by swinging arms 90 90 on the shaft 91, which also carries an arm 92. The latter is connected with the arm 93 of the bell-crank Y by a link 94.

It will be seen that after the bag-blank has been folded by the roll V and the cylinder it emerges from between the two as a complete bag with the bottom all folded and the folds pasted together.

As to the driving of the various mechanisms it will be understood that the cutting-rolls 1 and 2 are driven from the principal driving-shaft 105, carrying the cams 79 and 88 and the lower cutting-roll 2. The upper feed-roll 3 is driven by gear connections with the upper cutting-roll 1, and the tucking-roll 6 is driven by gear connections with the upper feed-roll 3. The tucking-roll 6 drives the

cylinder A by suitable gear connections, and the cylinder A is in turn connected with the folding and pasting roll N and the folding-rolls S and V, so as to drive the same. The  
5 shaft 60, carrying the wing-operating cam, is driven by gears from the roll N.

From the foregoing it will be seen that my invention possesses certain entirely novel features and that it greatly simplifies the  
10 making of the diamond-folded bag-bottom. It will also be seen that the mechanisms herein shown for carrying out the invention are simple, effective, and practical.

What I claim is—

15 1. The combination with the folding-bed having a gripping device; of means for feeding the bag-blank to the folding-bed; means for tucking the blank into the gripping device of the bed; power-transmitting connection between the tucking and gripping de-  
20 vices and the feeding means adapted to operate the tucking and gripping devices when a portion of the bag-blank, sufficient for a bag-bottom, has been fed to the folding-bed, so as  
25 to tuck and grip the blank in the rear of such portion, and devices for forming the bottom portion of the bag-blank into the bag-bottom while the blank is held by the gripping device.

2. The combination with the folding-bed  
30 having a transverse aperture into which the bag-blank can be tucked, of means for tucking such portion of the blank thereinto; a gripping device adapted for gripping and holding in position the portion of the blank  
35 so tucked, and constructed so that when closed it substantially forms a portion of the folding-bed; means for holding the gripping device normally closed, and for opening the same momentarily to allow the introduction  
40 of such portion of the bag-blank; mechanism for operating the tucking means at a time when the gripping device is open, and devices acting on the bottom portion of the blank to form the bag-bottom, while the gripping de-  
45 vice is in a closed position.

3. The combination with a rotary cylinder having a plurality of corresponding gripping devices situated at points equally distant on the cylinder; means for feeding bag-blanks  
50 to the cylinder; a device for tucking such bag-blank into the gripping devices as the latter approach in succession; power-transmitting connection between the cylinder, the tucking device and the feeding means, adapted  
55 to operate the tucking and gripping devices when a portion of each blank, sufficient for a bag-bottom, has been fed to the cylinder, so as to tuck and grip the blank in the rear of such portion, and devices for forming  
60 the bottom portion of the bag-blank into the bag-bottom, while the blank is held by each one of the gripping devices.

4. The combination with a rotary cylinder carrying a gripping device, consisting of a  
65 pair of swinging arms provided with a gripping-blade; a rock-shaft carrying said arms, and also carrying a rocker-arm extending

from the rock-shaft in a direction away from the axis of the cylinder; an annular cam arranged outside of the path of travel of said  
70 rock-shaft, and constructed with an inwardly-extending projection which engages the rocker-arm and thereby causes the rock-shaft to turn and swing the swinging arms thereon  
75 backwardly; a spring secured to the cylinder, and also to an inwardly-extending arm on the rock-shaft for automatically turning the rock-shaft in a direction to swing the gripping-blade closed, and devices for acting on the  
80 bottom portion of the blank to form the bag-bottom while the gripping device is in a closed position.

5. The combination with a folding-bed carrying a gripping device; of means for feeding the blank to the folding-bed; means for tuck-  
85 ing the bag-blank into such gripping device; power-transmitting connection between the gripping device, the feeding means and the tucking means, whereby a portion of the blank, sufficient for a bag-bottom, is fed to  
90 the folding-bed before the blank is tucked into the gripping device; and means for forming the bottom portion of the blank into a diamond fold while the blank is held by the gripping device.  
95

6. The combination with a folding-bed carrying a gripping device; means for tucking a portion of the bag-blank into such gripping device; means for entering the tuck of the blank to form the diamond fold while the  
100 blank is engaged by the gripping device; and mechanism for holding the blank in position to be engaged by such tuck-entering means.

7. The combination with the folding-bed and also with the tucking and gripping de-  
105 vices and means for engaging the blank for folding it; of a roll having mutilations for allowing the blank to proceed in a fluffy condition; a couple of sets of swinging arms, one in each set being situated with its ends above  
110 the advancing blank, and the other with its ends below the bottom of the blank; a blade connecting the lower ends of the last-mentioned arms; fingers connected therewith and extended around the edges of the plies and  
115 into the tucks; and means for holding such arms in position to engage the blank during the engagement of the ply-engaging means therewith and for withdrawing the same after such engagement.  
120

8. The combination with the folding-bed having an aperture and a gripping device carried by the bed and consisting of a jaw capable of swinging against one edge of said aperture; devices for entering the tucks of the  
125 blank and folding the plies thereof; and mechanism for closing said jaw and means for operating such devices after the jaw has been closed.

9. The combination with the rotary cylinder having a plurality of apertures and with the gripping-jaws adapted to close against one edge of said apertures, and also with means  
130 for tucking a portion of the blank into the

gripping-jaws; of a couple of sets of blades, one on each side of the cylinder; means for closing said gripping-jaws; means for advancing the blades simultaneously into the two tucks after one of the gripping devices has gripped the blank; and mechanism for swinging the forward blades forwardly and the rear ones rearwardly, after they have entered the tuck.

10. The combination with the cylinder, of a couple of sets of tuck-entering and ply-folding blades carried thereby; means for moving said blades inwardly and then swinging them downwardly; and a couple of sets of nippers, respectively arranged at the sides of the blades so that the latter will meet and depress them.

11. The combination of a pair of tuck-entering and ply-folding blades adapted and arranged to enter the blank tucks in a substantially radial position, and both capable of being swung downwardly to fold plies of the blank; nippers arranged at the sides of such blades; spring means tending to hold the nippers against the blades; and means for holding both the nippers at a slight distance from the blades when the latter are in normal position.

12. The combination of the folding-bed having an aperture and carrying a gripping-jaw adapted to swing from against one edge of said aperture; means for feeding the blank to the folding-bed; a tucking device for tucking the blank into the gripping device; power-transmitting connection between the feeding means and the tucking and gripping jaw, whereby the blank will be tucked and gripped after a length sufficient for a bag-bottom, is fed to the folding-bed; means for holding the gripping-jaw normally closed; means for temporarily opening the jaw; and means for withdrawing the blank from the jaw while opened.

13. The combination with the rotary cylinder; of a gripping device; means for holding the same normally closed and also for momentarily opening the same; a slide carried by the cylinder and arranged for projection therefrom; means for holding the slide normally in a retracted position; a cam for projecting the same; and mechanism for simultaneously opening the gripping device.

14. The combination with the folding-bed provided with gripping devices; of tucking devices and feeding means, and power-transmitting connection for causing the operation of the tucking and gripping devices when a portion of the bag-blank, sufficient for a bag-bottom, has been fed to the folding-bed; of means for forming the same into the box-like structure; a couple of swinging wings mounted so as to allow them to be swung down to fold in the side of the box; and mechanism for swinging such wings downwardly when the box-like structure passes below them.

15. The combination with the rotary cylinder provided with means for engaging the

blank; of means for forming the blank into the box-like structure; a couple of swinging wings adapted to fold the box into the diamond fold; supports to which said wings are pivotally connected; a couple of links pivotally connected to the wings; and a bar connecting the other ends of the links.

16. The combination with the folding-bed; of a gripping device carried thereby; means for holding such device normally closed; means for momentarily opening the same to receive the blank; means for tucking the blank into the gripping device, the blank being doubled or creased in such tucking operation; means for feeding the blank to the folding-bed, and power-transmitting connection between the feeding means and the gripping and tucking devices, whereby the tucker and gripper act at a time when a portion of the bag-blank, sufficient for a bag-bottom, has been fed to the folding-bed; means for forming one or more folds in the bottom portion of the bag-blanks; means for opening the gripping device; and means for withdrawing the creased or doubled portion of the blank from the gripping device after said folding operation.

17. The combination with the folding-bed; of a gripping device carried thereby; means for opening and closing such device to receive and hold the blank; means for tucking the blank into the gripping device so as to double or crease the same; means for forming the diamond fold while the blank is held by the gripping device; and means for opening the gripping device and withdrawing the blank therefrom after the formation of such fold.

18. The combination with the folding-bed; of a gripping device for receiving and engaging a portion of the blank; means for holding such device normally closed; means for opening the same momentarily to receive the blank; a couple of wings for turning down the sides of the blank to form the diamond fold; means for operating such wings; a blade arranged for projection from the folding-bed; means for temporarily opening the gripping device to release the blank; and mechanism for projecting the blade when the gripping device is open, without interfering with the operation of the wings.

19. A bag-bottoming mechanism comprising a folding-bed provided with a gripping device adapted to receive a portion of the blank; means for feeding the blank to the gripping device; and power-transmitting connection between the feeding means and the gripping devices, whereby the length of blank, sufficient for a bag-bottom, is fed to the gripping device before the blank is gripped thereby; means for tucking the blank into such device; means for forming the bottom portion of the blank into the box-like structure; means for turning down the sides of the box to form the diamond fold; means for releasing the blank from the gripper and taking up

the slack formed by the portion tucked there-into; and mechanism for pasting the fold and completing the bottom.

20. The combination with a cylinder having  
5 a gripping device and providing the folding-bed, of a reciprocating blade carried by the bed and reciprocable therethrough; spring means for holding the blade in a retracted position; a cam arranged within the cylinder  
10 and constructed with a projection adapted to project the blade; and means for operating the gripping device when the cam projects the blade from the cylinder.

21. The combination with the folding-bed  
15 and means for folding the diamond fold thereupon; of a leading and a tucking blade, the leading-blade being adapted for reciprocation toward and away from the folding-bed, and the tucking-blade being arranged for recip-  
20 rocation in a direction across the path of the leading-blade; means for reciprocating the leading-blade toward and away from the folding-bed; and means for reciprocating the  
25 tucking-blade across the path of the leading-blade after the latter has been withdrawn from the folding-bed.

22. The combination with the folding-bed;  
of a pair of swinging blades, one for leading  
30 the blank and the other for tucking the same; swinging arms carrying said blades; a bell-

crank rigidly connected with the arm carrying the tucking-blade, and having one of its arms substantially in alignment with said arm, and the other one extending laterally there-  
35 from; a link pivotally connected with said laterally-extending bell-crank arm and also with an arm associated with the arm carrying the leading-blade; and means for rocking said bell-crank.

23. The combination with the folding-bed; 40  
of leading and tucking blades; swinging arms carrying said blades; a bell-crank fixed to the swinging arm carrying the tucking-blade, and having one of its arms substantially in alignment with such blade-carrying arm, and the  
45 other extending laterally therefrom; a link pivotally connected to said laterally-extending bell-crank arm, and also to an arm associated with the arm carrying the leading-blade; a link pivotally connected to the other  
50 arm of said bell-crank; a lever pivotally connected to said link; and a cam adapted to swing said lever.

Signed by me at Chicago, Illinois, this 20th day of November, 1899.

HERBERT E. WESTERVELT.

Witnesses:

A. MILLER BELFIELD,  
Q. E. MELDRUM.