

W. A. LORENZ.
PAPER BAG MACHINE.

APPLICATION FILED DEC. 11, 1902.

NO MODEL.

3 SHEETS—SHEET 1.

Fig. 1

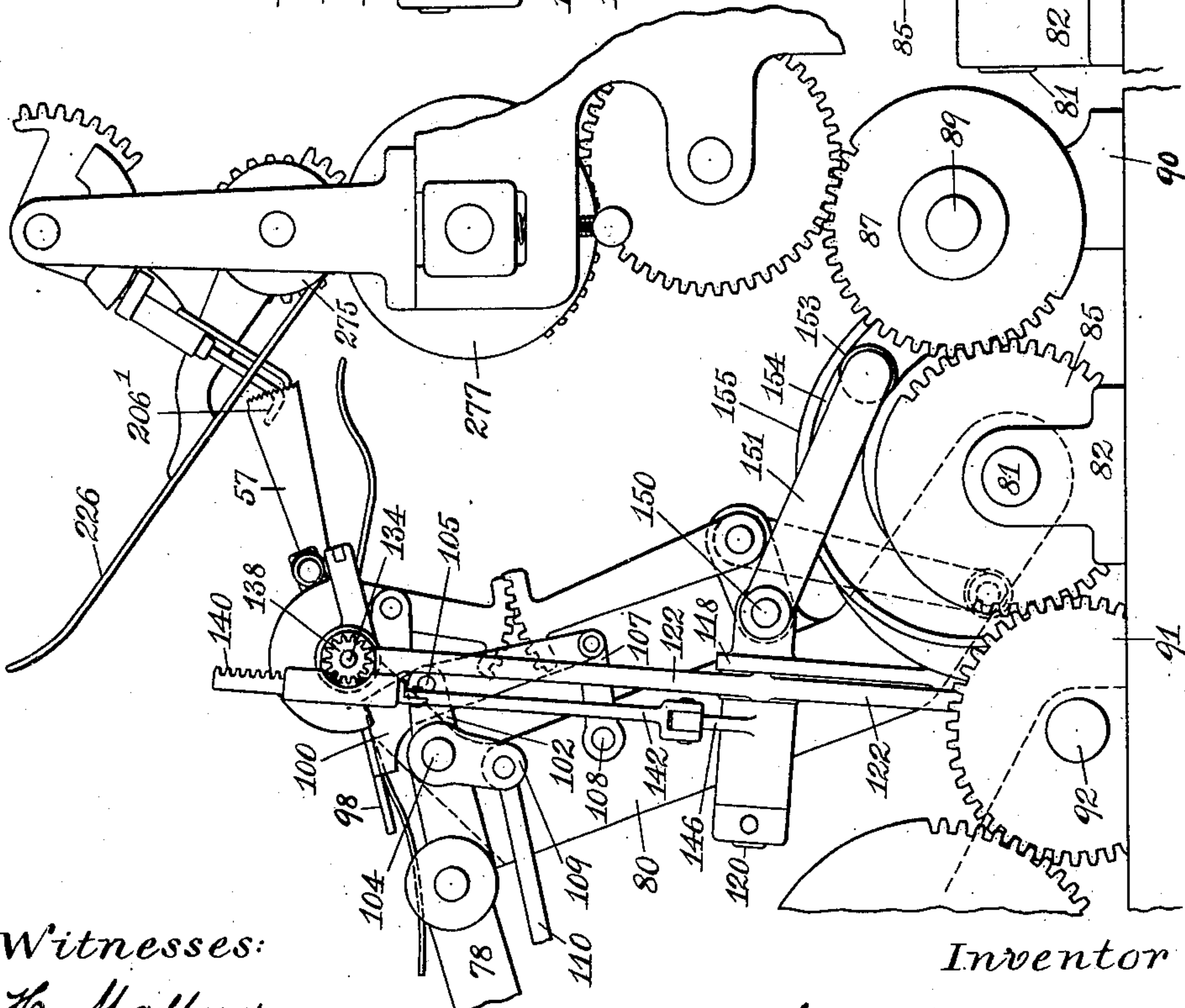
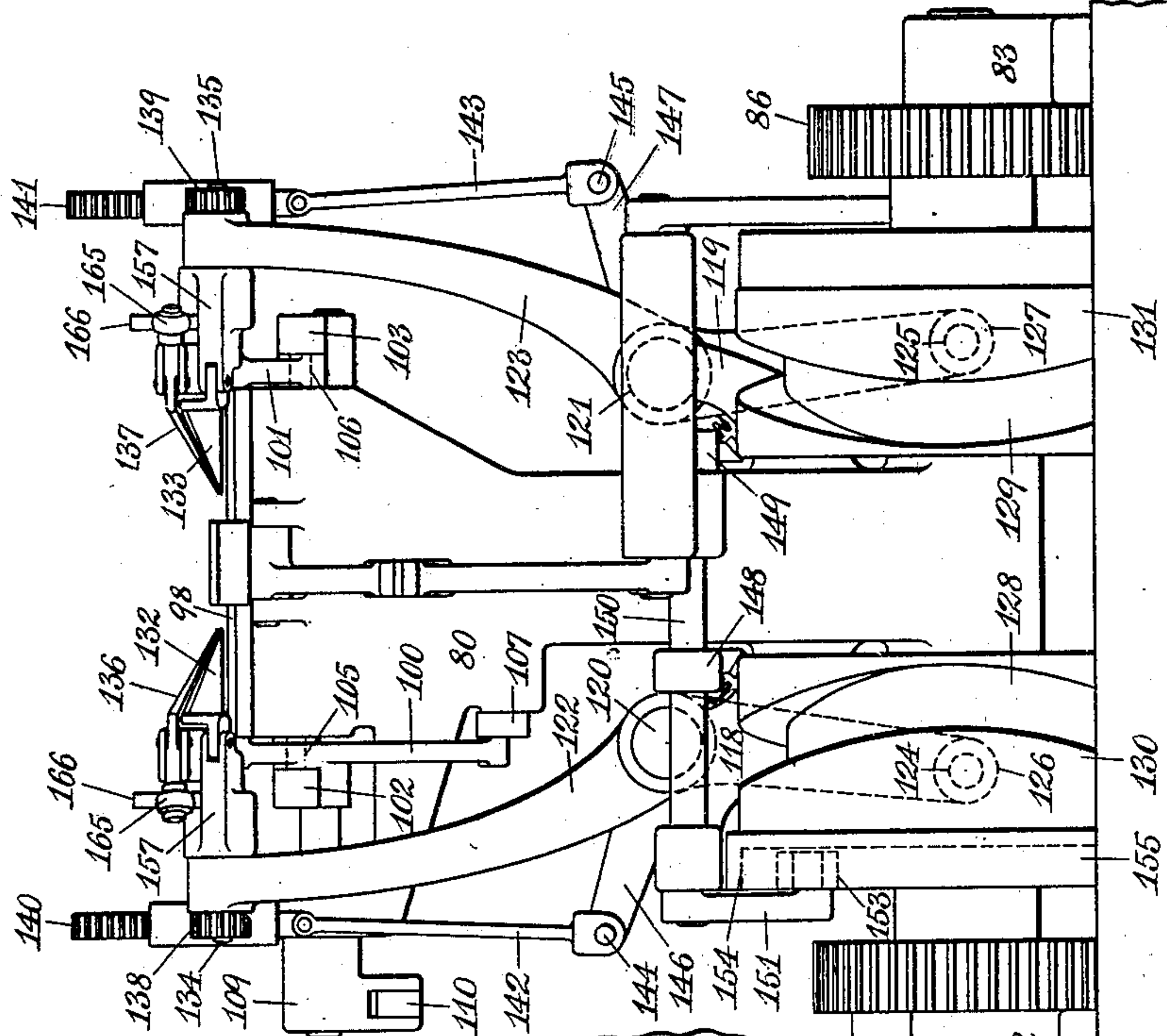


Fig. 2



Witnesses:

H. Mallory
Joseph Thwait

Inventor

William A. Lorenz

W. A. LORENZ.
PAPER BAG MACHINE.
APPLICATION FILED DEC. 11, 1902.

NO MODEL.

3 SHEETS—SHEET 2.

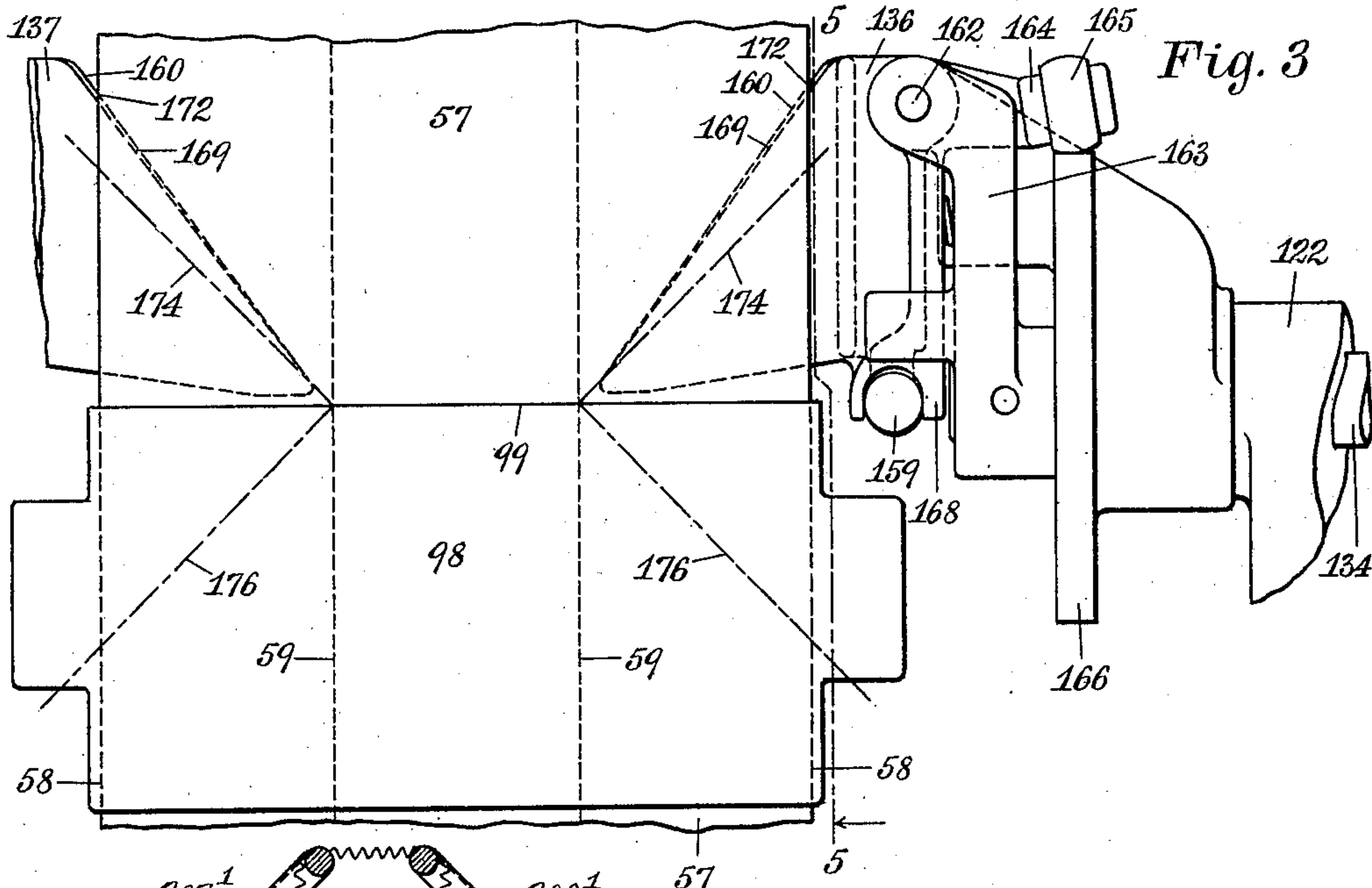


Fig. 3

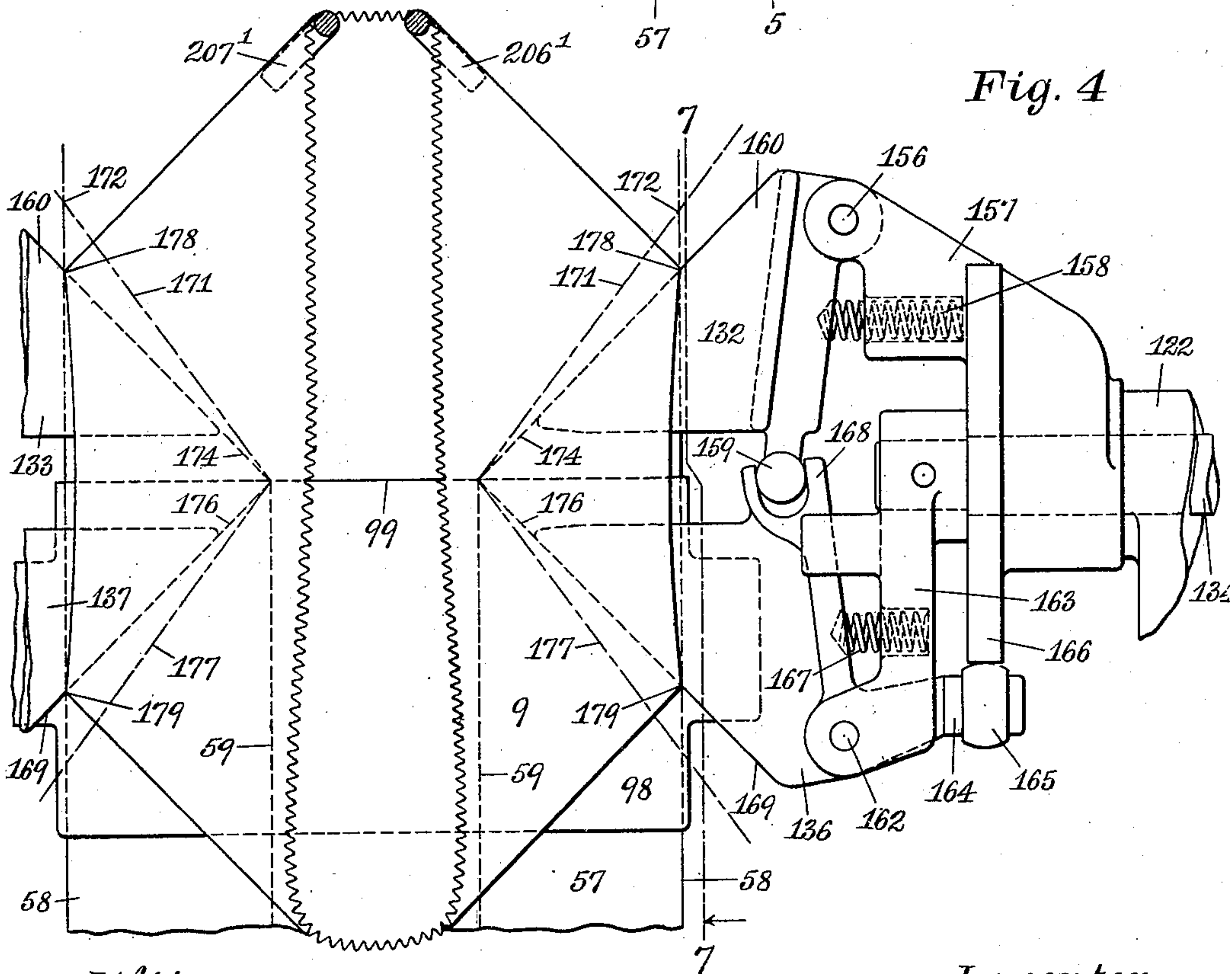


Fig. 4

Witnesses:

H. Mallory
Joseph Meritt

Inventor

William A. Lorenz

W. A. LORENZ.
PAPER BAG MACHINE.
APPLICATION FILED DEC. 11, 1902.

NO MODEL.

3 SHEETS—SHEET 3.

Fig. 5

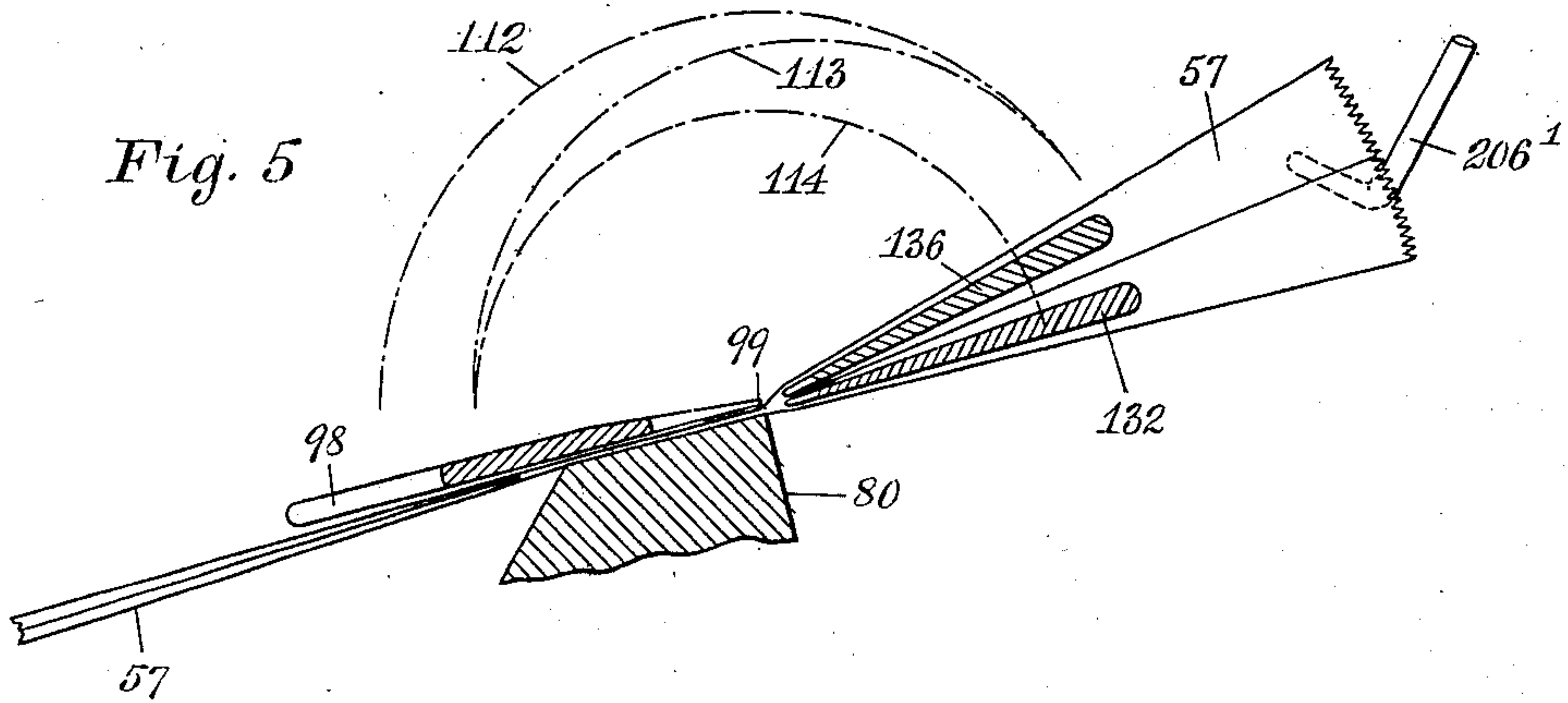


Fig. 6

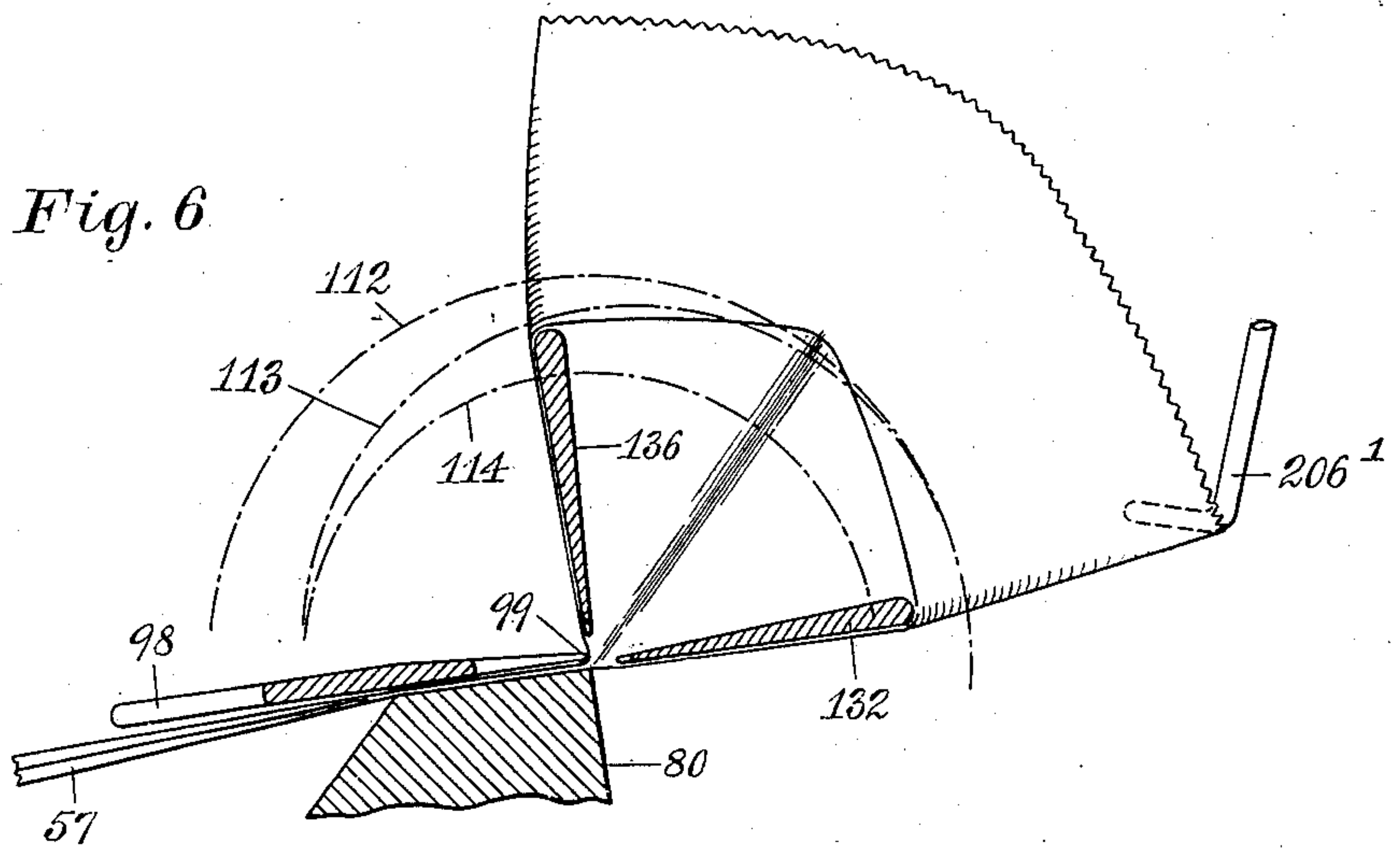
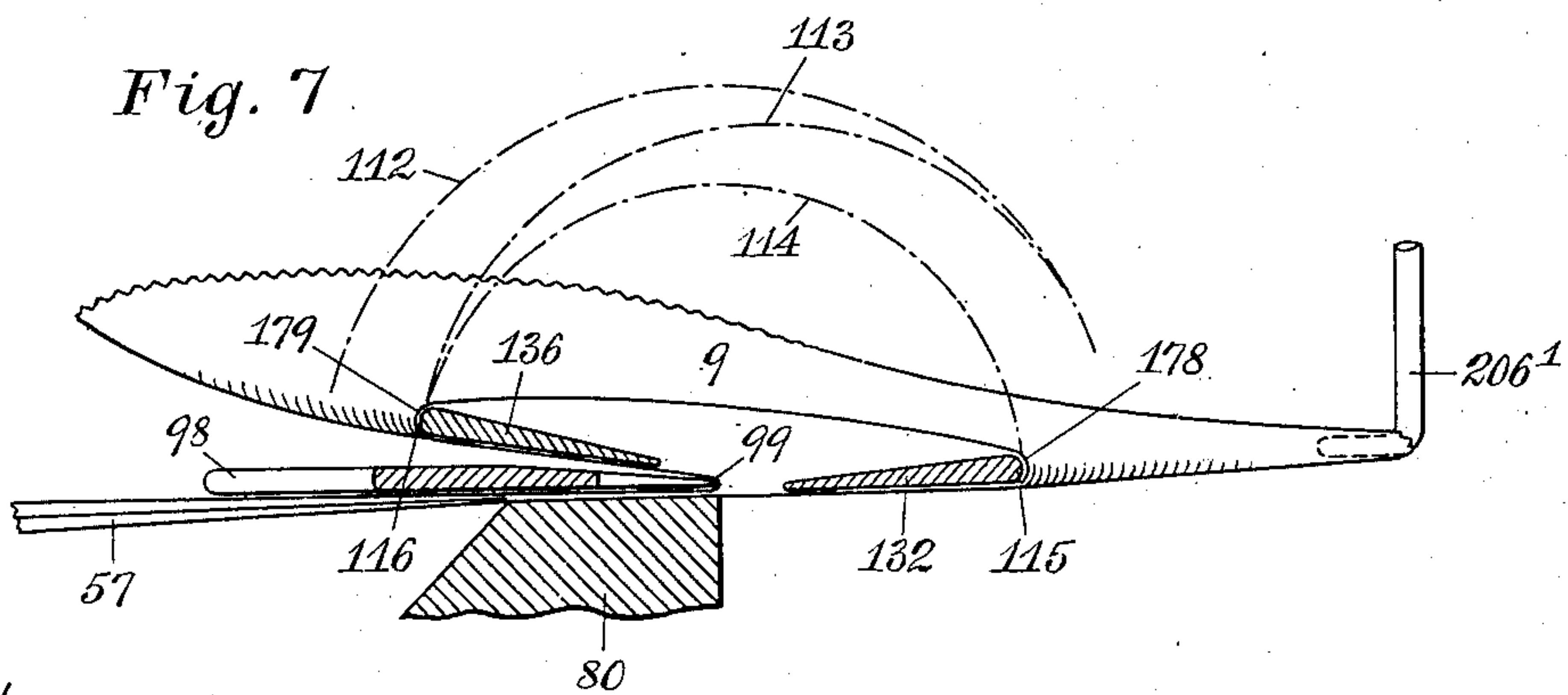


Fig. 7



Witnesses:

H. Malin
Joseph Merritt

Inventor

William A. Lorenz

UNITED STATES PATENT OFFICE.

WILLIAM A. LORENZ, OF HARTFORD, CONNECTICUT.

PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 733,982, dated July 21, 1903.

Application filed December 11, 1902. Serial No. 134,764. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM A. LORENZ, a citizen of the United States, and a resident of 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 invention relates to machines for manufacturing square-bottom paper bags; and it has for one of its objects the provision of a machine in which the so-called "inside triangular folds" and in which the "diamond" may be formed in a bellows-sided or tucked tube or blank in a novel and rapid manner.

This invention may be adapted to many of the various forms of paper-bag machines heretofore constructed, and may be adapted to machines having traveling blank-carriers or to machines in which the folding devices themselves carry the blank forward without the use of any traveling folding-bed.

My invention consists more especially of an improvement in the construction and operation of a machine for which Letters Patent were granted to Lorenz and Honiss on April 26, 1887, No. 361,951, to which reference may be had.

My invention relates more especially to the mechanism employed for opening the bag-blank to form the diamond fold, this mechanism comprising suitable devices, such as a pair of tuck-holders and of box-holders, so organized as to engage the upper and lower plies of the tucked tube at such points thereof of the distance of which at the margins of the blank from the defining-line is greater than the depths of the tucks, while when the tuck and box holders are opening out the open end of the blank to form the diamond said points of engagement are gradually shifted toward the defining-line until their distance from said line is equal to the depth of the tucks. These devices may be carried upon a traveling folding-bed, if preferred.

My invention comprises means whereby the box-holders and tuck-holders are moved toward each other laterally of the blank, so as to engage it, and means whereby the tuck and box holding or engaging devices are moved apart, so as to open out the blank and develop the inside triangular folds and the dia-

mond; and, furthermore, it comprises means whereby the tuck and box holders are gradually moved in such a manner so as to bring the points of intersection of the holders with the margins of the plies toward the defining-line, while the movement apart or the arc of travel of the holders relative to each other is increased until said holders are in position at opposite sides of the defining-line, at which time the inside triangular folds and the diamond will have been developed.

My invention furthermore comprises a pair of oscillatory box-holders and means for varying the position of angle of both the tuck-holders and box-holders relative to the axis of oscillation of the box-holders while the diamond is being formed.

In the patent above referred to the tuck and box holders enter the tucked sides of the tube laterally until the points of intersection of their engaging or angular edges with the margins of the upper and lower plies are at a distance from the defining-line equal to the depth of the tucks, and in this position the holders remain, while the box-holders receive only an oscillatory movement relative to the tuck-holders. In the present invention the tuck and box holders, in addition to their oscillatory movement and their movement toward and away from each other laterally of the blank, receive also an angular movement relative to the axis of oscillation, so that the angle formed by each angular engaging edge of the tuck and box holders, respectively, will be at first greater than forty-five degrees, and will then be gradually lessened during the diamond-folding operation until the box and tuck holders are at opposite sides of the defining-line, at which time the angle formed by the engaging edges will be substantially a right angle, as required for the inside triangular folds.

Inasmuch as the present invention comprises an improvement on the machine shown in the patent above referred to, only such parts of a machine are illustrated as are directly affected by my invention, and for that reason the accompanying drawings show a portion of the other parts of the machine, such as may be necessary to form a clear understanding of the invention as applied to the patent above referred to.

This invention is illustrated in the drawings accompanying the specification, in which—

Figure 1 represents a side view, and Fig. 2 an end view thereof. Fig. 3 shows an enlarged view of the diamond-folding devices in position ready to begin the folding operation; and Fig. 4 shows these devices of Fig. 3 after the completion of the diamond-folding operation, a bag-blank being shown in these figures. Fig. 5 shows a section taken on the line 5 5 of Fig. 3, showing the position of the devices before the diamond-folding operation. Fig. 6 shows the devices of Fig. 5 in an intermediate position; and Fig. 7 shows these devices in section, taken on the line 7 7 of Fig. 4, showing the devices in position after the diamond-forming operation has been completed.

In the accompanying drawings, in which similar characters denote similar parts, 80 denotes the blank-carrier or supporting-bed, to which a rocking or reciprocating motion may be imparted by a link or connecting-rod 78, which may be operated in any suitable manner—as is, for instance, shown in Patent No. 361,951, above referred to. The carrier 80 vibrates upon a shaft 81, supported in bearings 82 and 83 and carrying gears 85 and 86 in engagement with gears 87 and 88, which are fixed to a shaft 89, journaled in suitable brackets 90. Also in engagement with a gear 85 is a gear 91, journaled upon a stud 92, and which serves as an intermediate with the driving mechanism of the machine.

Mounted upon the upper part of the carrier 80 is a blank-holding device comprising a defining-plate 98, having a defining edge 99, mounted for vertical movement relative to the upper surface of the carrier and secured to brackets 100 and 101, which receive vertical motion by a pair of arms 102 and 103, fixed to a rock-shaft 104, connected with said arms—as, for instance, by pins 105 and 106. The lower end of the bracket 100 carries a link 107, which is pivoted at 108 to the carrier 80 and operates, in conjunction with the arm 102, to cause the plate 98 to remain substantially in parallelism with the upper surface of the folding-bed during its movement transversely thereof. Secured to the shaft 104 is an arm 109, to which is pivotally secured a connecting-rod 110, the other end of which may be operated in any suitable manner—as shown, for instance, in the patent referred to—and so as to raise the defining-plate 98 into a position to clear the upper surface of the carrier 80 in order to permit the blank to advance below the plate and to lower the plate to hold the blank upon the surface of the carrier.

The mechanism whereby the outer end of blank will be opened to form the diamond comprises a pair of levers 122 and 123, which are mounted upon studs 120 and 121, respectively, the latter being carried on ears 118 and 119, projecting from the carrier 80. The levers 122 and 123 are provided with studs 124 and 125, carrying cam-rollers 126 and 127,

in engagement with cam-grooves 128 129 of cams 130 131, the cams being attached to the gears 85 and 86 above mentioned. To the upper ends of the tuck-levers 122 123 are secured a pair of tuck-holders 132 133, which have triangular ends projecting inwardly and which receive a reciprocating motion toward and away from each other as the cams 130 and 131 rotate. Journaled in the upper ends of the truck-levers 122 and 123 are a pair of rock-shafts 134 and 135, carrying a pair of box-holders 136 and 137, which are also provided with triangular-shaped ends. These holders are operatively connected with a cam 155, attached to the cam 130, and receive therefrom a rotary reciprocatory motion of about one hundred and eighty degrees substantially in the following manner: Pinions 138 and 139, secured on the box-holder shafts 134 and 135, are driven by means of racks 140 and 141, sliding in casings attached to the upper ends of the tuck-levers and operated by means of connecting-rods 142 and 143, connected, as at 144 and 145, to a pair of oscillatory levers 146 and 147, also journaled on the studs 120 and 121 above referred to. The opposite ends of the levers 146 and 147 carry bevel-sectors in engagement with sector-arms 148 and 149, fastened to a shaft 150, journaled for oscillation in the carrier 80. To the outer end of the shaft 150 is secured an arm 151, carrying a roller 153, which is in engagement with a cam-groove 154 in the cam 155, and thus transmitting an oscillatory movement simultaneously to the levers 146 and 147, and consequently to the box-holders 136 and 137.

The mechanism thus far described corresponds with that shown in Patent No. 361,951, and I will now describe those features which constitute the elements of my present invention.

The tuck-holders 132 and 133 are pivoted on pins 156, which are carried in projections 157 157, secured to or forming a part of the tuck-levers 122 and 123. These tuck-holders 132 and 133 are pressed away from the projections 157 by means of springs 158. The tuck-holder blades 132 and 133 are provided with angular edges 160 160, and they are further provided with balls 159. The box-holders 136 137 are pivoted on pins 162, carried in arms 163, which are secured to the rock-shafts 134 135 above referred to. The box-holders 136 137 are also provided with rearward cam-arms 164, carrying cam-rollers 165 165, in engagement with cams 166 166, which are carried on the levers 122 123, respectively, and which serve during the movement of the rollers 165 around said cams 166 to swing the tuck-holders 136 137 inward and outward around the pivot-axis 162. The box-holders 136 and 137 are also provided with forks 168, which engage or connect the balls 159 of the tuck-holders 132 and 133, enabling the box-holders to swing the tuck-holders around the pivot-axis 156. The box-holders may also be

provided with springs 167, that press them away from the arms 163.

The organization of the two pair of tuck-holders and the two pair of box-holders and of their supporting-levers is such that during the feeding of the bellows-sided tube 57 to the folding-bed 80 the tuck-holders and box-holders will be in a position in respect to one another as that shown in Fig. 3; but they will not have entered into the tucks of the tube 57, as shown in Fig. 3. After the blank has been fed and secured to the carrier 80 the tuck-holders and the box-holders are moved into the tucks, as shown in Figs. 3 and 5, moving to the position shown in Figs. 1 and 2. In this position the engaging or angular edges 160 of the tuck-holders and 169 of the box-holders correspond with the forward angular lines 171. The angle formed by these lines with the cross-fold line 99 is greater than forty-five degrees, this line 99 being coincident with the front edge of the defining-plate and coincident with the axes of oscillation of the rock-shafts 134 and 135. The depth of the tucks reaches from the margins or edges 58 of the blank 57 to the lines 59. The distance from the points 172 on the edges 58 of the blank to the edge 99 of the defining-plate is greater than the depth of the tuck from 58 to 59. The angular lines 174 indicate forty-five-degree angles with the edge 99 of the defining-plate, and the points 175 indicate distances from the edge 99 equal to the depth of the tucks from 58 to 59. The lines 176 indicate forty-five-degree angles with the edge 99 of the defining-plate, and the lines 177, Fig. 4, indicate angular lines showing greater angles than forty-five degrees with the edge 99 of the defining-plate.

In the Patent No. 361,951, referred to, the fixed tuck-holders 132 and 133 and the movable box-holders 136 and 137 enter the tucks, and during the turning over of the box-holders and in the development of the diamond the position of the angular edges of these holders remains always the same. In the present invention the tuck and box holders enter the tucks to the position shown in Fig. 3, where the angular edges of those holders correspond substantially with the lines 171. The box-holders 136 and 137 are then turned over from the position shown in Fig. 3 to that shown in Fig. 4 to form the inside triangular folds, while the sweeper-fingers 206' and 207' engage the front end of the blank, thereby assisting in the formation of the diamond 9. If the box-holders 136 and 137 were turned over from the position shown in Fig. 3, which corresponds with the lines 171, to the position which corresponds to the lines 177 in Fig. 4, the inside triangular folds of the diamond would be torn, since the paper would be stretched much beyond the natural fold-lines corresponding to the forty-five-degree angular lines 174 and 176. Therefore, while the folding of the diamond takes place the tuck and box holders are carried outwardly or

away from the blank during the diamond-folding operation, being moved outwardly a little by the cams 130 and 131 to the position of Fig. 4, and during this outward movement the cams 166 rock the box-holders from the position shown in Fig. 3 to that shown in Fig. 4, the outer angular edges of the two pairs of holders at the close of this movement corresponding with the forty-five-degree lines 174 and 176. Thus the inside triangular folds are developed by the tuck and box holders, which first stretch the tucks at points beyond the points 175—namely, at the points 172—the angular edges of the holders gradually moving to the forty-five-degree position, so as to correspond with the points 178 and 179 at the edges of the blank.

The diamond 9 having been substantially defined and the carrier 80, together with its folding mechanism having advanced as described in the Patent No. 361,951, the plate 226 is lowered upon that blank, as described in the said patent, in order to flatten and complete the diamond preparatory to being delivered to the gripper-rolls 275 and 277. When the front end of the completed diamond has been delivered to these rolls, the plate 98 is raised a little, so as to release the blank from the carrier 80, and the tuck and box holders are withdrawn by moving outwardly away from the blank. The box-holders 136 and 137 are then turned forward above and adjacent to the tuck-holders 132 and 133, and in that position all the holders are ready to enter the tucks of the next blank.

Figs. 5, 6, and 7 are sectional views at the marginal edge 58 on line 5 5 of Fig. 3, showing three positions of the tuck and box holders, and these views clearly show the path of travel of the angular edges of the tuck and box holders at the marginal edge of the blank at different times during the diamond-folding operation. In Fig. 5 the tuck-holder 132 and the box-holder 136 reach as far as the circle 112, these holders being entered into the tuck of the blank 57 as deep as shown in Fig. 3. In Fig. 6 the blank has been opened out partially by the angular motion of the box-holder 136, which has moved around the axis 99. During this motion both holders 132 and 136 have moved outwardly or laterally away from the blank to a slight extent and their edges have moved away from the line 112, the edge of the box-holder 136 traveling along the line 113. During the further movement of the holder 136 from that shown in Fig. 6 to that shown in Fig. 7 it will move outwardly away from the blank a little, as will also the tuck-holder 132, until the edges of these holders will correspond with that shown in Fig. 7, where the edges 115 and 116 correspond with the points 178 and 179 of Fig. 4, extending to the circle 114. These points are equal in distance to the depth of the tucks.

Various modifications may be made in the construction of these tuck-holders without

departing from the spirit of the invention. This consists, essentially, in holding devices which hold the marginal edges of the blank during the diamond-forming operation and
 5 engage that blank first at points 172 by both the tuck and box holders, which holding devices during the diamond-forming operation move from these points 172 to the points 178 and 179. These holding devices may be in
 10 the nature of blades, fingers, or similar devices, which perform the functions just described. Furthermore, while I prefer this construction, by which a variable motion is given to both the tuck-holders and box-holders, this variable angular motion may be im-
 15 parted either to the tuck-holders or to the box-holders. If the angular motion is imparted to the tuck-holders from line 171 to line 174 and not to the box-holders, the edges of the box-holders will match the angular
 20 lines 174 and 176 in Figs. 3 and 4, respectively, during the diamond-folding operation, both holders finishing their folding operation in the position shown in Fig. 4. The reverse
 25 would take place if the angular motion is imparted to the box-holders from line 171 to line 176, the tuck-holder 132 in that case matching the line 174 from the beginning to the end of the folding operation, both hold-
 30 ers ending their motion as in Fig. 4. Therefore I do not wish to confine myself to giving variable motion to both the pairs of holders, since a large part of the advantage gained by this device may be had by the variable
 35 motion of only one pair of the holders in the manner described.

I claim as my invention—

1. The combination with a pair of holders for engaging the lower plies of a bellows-sided
 40 blank, of a member having a defining edge; a pair of holders for engaging the upper plies of said blank; and means for causing one pair of holders to engage the blank at such
 45 points on the upper or lower ply margins of the blank, the distance of which from the defining edge is greater than the depth of the tucks.

2. The combination with a pair of holders for engaging the lower plies of a bellows-sided
 50 blank, of a member having a defining edge; a pair of holders for engaging the upper plies of said blank; means for causing one pair of holders to engage the blank at such points on the upper or lower ply margins of the blank,
 55 the distance of which from the defining edge is greater than the depth of the tucks; and means for moving one pair of holders away from the other pair during the diamond-forming operation.

3. The combination with a pair of holders for engaging the lower plies of a bellows-sided blank with a member having a defining edge; a pair of holders for engaging the upper plies of said blank; means for causing the two
 60 pairs of holders to engage the blank at such points on the upper and lower ply margins of the blank, the distance of which from the

defining edge is greater than the depth of the tucks; and means for moving the two pairs of holders apart during the diamond-forming operation.

4. The combination with a blank-carrier, and with tuck-holders cooperative therewith, of a member having a defining edge; box-holders; means for causing the tuck-holders and the box-holders to engage the blank at such points on the upper and lower ply margins of the blank, the distance of which from the defining edge is greater than the depth of the tucks; and means for moving the tuck and box holders apart during the diamond-forming operation.

5. The combination with a pair of holders for engaging the lower plies of a bellows-sided blank, with a member having a defining edge; a pair of holders for engaging the upper plies of said blank; means for causing the two pairs of holders to engage the blank at such points on the upper and lower ply margins of the blank, the distance of which from the defining edge is greater than the depth of the tucks; and means for varying the distance of the engaging edges of the holders from the defining edge during the diamond-forming operation.

6. The combination with a blank-carrier, and with tuck-holders cooperative therewith; of a member having a defining edge; means for causing said holders to engage the blank at such points on the upper or lower ply margins of the blank, the distance of which from the defining edge is greater than the depth of the tucks; and means for varying the distance of the engaging edges of the holders from the defining edge during the diamond-forming operation.

7. The combination with tuck-holders having angular edges, with a member having a defining edge; box-holders having angular edges; means for causing the angular edges of the tuck-holders and the angular edges of the box-holders to engage the blank at angles on the upper and lower plies of the blank, which are greater than forty-five degrees during the diamond-forming operation, and which will be substantially forty-five degrees at the end of the diamond-forming operation; and means for moving the tuck and box holders apart.

8. The combination with a blank-carrier, and with tuck-holders having angular edges cooperative therewith; of a member having a defining edge; box-holders having angular edges; means for causing the angular edges of the tuck-holders and the angular edges of the box-holders to engage the blank at angles on the upper and lower plies of the blank, which are greater than forty-five degrees during the diamond-forming operation, and which will be substantially forty-five degrees at the end of the diamond-forming operation; and means for moving the tuck and box holders apart.

9. The combination with tuck-holders hav-

ing angular edges, with a member having a defining edge; box-holders having angular edges; means for causing the angular edges of the tuck-holders and the angular edges of the box-holders to engage the blank at angles on the upper and lower plies of the blank, which are greater than forty-five degrees during the diamond-forming operation, and which will be substantially forty-five degrees at the end of the diamond-forming operation; and means for moving apart and varying the distance of the angular edges of said tuck-holders and box-holders from the defining edge.

10. The combination with tuck-holders having angular edges, with a member having a defining edge; box-holders having angular edges; means for causing the angular edges of the tuck-holders and the angular edges of the box-holders to engage the blank at angles on the upper and lower plies of the blank, which are greater than forty-five degrees during the diamond-forming operation, and which will be substantially forty-five degrees at the end of the diamond-forming operation; means for moving apart and varying the angular edges of said tuck-holders and box-holders; and means for flattening the diamond.

11. The combination with a blank-carrier, and with tuck-holders having angular edges cooperative therewith; of a member having a defining edge; box-holders having angular edges; means for causing the angular edges of the tuck-holders and the box-holders to engage the blank at angles on the upper and lower plies of the blank, which are greater than forty-five degrees, during the diamond-forming operation, and which will be substantially forty-five degrees at the end of the diamond-forming operation; means for moving apart and varying the distance of the angular edges of said tuck-holders and box-holders from the defining edge; and means for flattening the diamond.

12. The combination with a blank-carrier, and with tuck-holders having angular edges cooperative therewith; of a member having a defining edge; box-holders having angular edges; means for causing the angular edges of the tuck-holders and the angular edges of the box-holders to engage the blank at angles on the upper and lower plies of the blank, which are greater than forty-five degrees

during the diamond-forming operation, and which will be substantially forty-five degrees at the end of the diamond-forming operation; and means for moving apart and varying the distance of the angular edges of said tuck-holders and box-holders from the defining edge.

13. The combination with tuck-holders having angular edges, with a member having a defining edge; box-holders having angular edges; means for causing the angular edges of the tuck-holders and the angular edges of the box-holders to engage the blank at angles on the upper and lower plies of the blank, which are greater than forty-five degrees during the diamond-forming operation, and which will be substantially forty-five degrees at the end of the diamond-forming operation; and a cam for varying the angle of the engaging edges of the tuck and box holders relative to the axis of oscillation of the latter.

14. The combination with tuck-holders having angular edges, with a member having a defining edge; box-holders having angular edges; means for causing the angular edges of the tuck-holders and the angular edges of the box-holders to engage the blank at angles on the upper and lower plies of the blank, which are greater than forty-five degrees during the diamond-forming operation, and which will be substantially forty-five degrees at the end of the diamond-forming operation; means for moving the tuck and box holders apart; and a cam for varying the angle of the engaging edges of one pair of holders.

15. The combination with holders having angular edges, with a member having a defining edge; box-holders having angular edges; a connection between the box-holders and tuck-holders; a cam for varying the angle of the engaging edge of the box-holders relative to the axis of oscillation thereof; and means for moving one pair of holders away from the other during the diamond-forming operation.

In testimony whereof I have signed my name to this specification, in the presence of two subscribing witnesses, this 8th day of December, 1902.

WILLIAM A. LORENZ.

Witnesses:

H. MALLNER,

NELLIE PHOENIX.