E. E. CLAUSSEN.

PAPER BAG MACHINE.

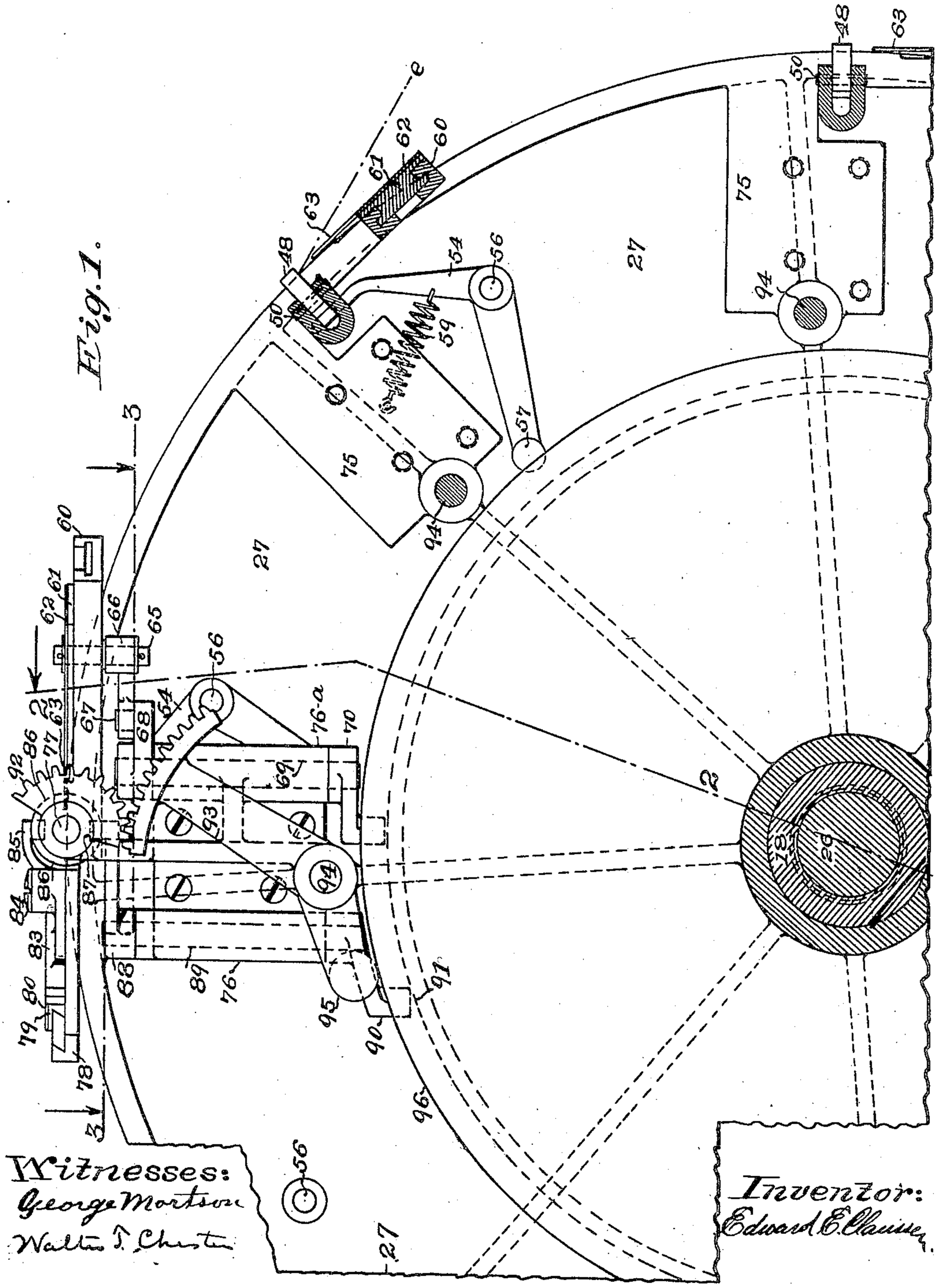
APPLICATION FILED OCT. 12, 1906.

925,295.

Patented June 15, 1909.

6 SHEETS—SHEET 1.

Fig. 1.



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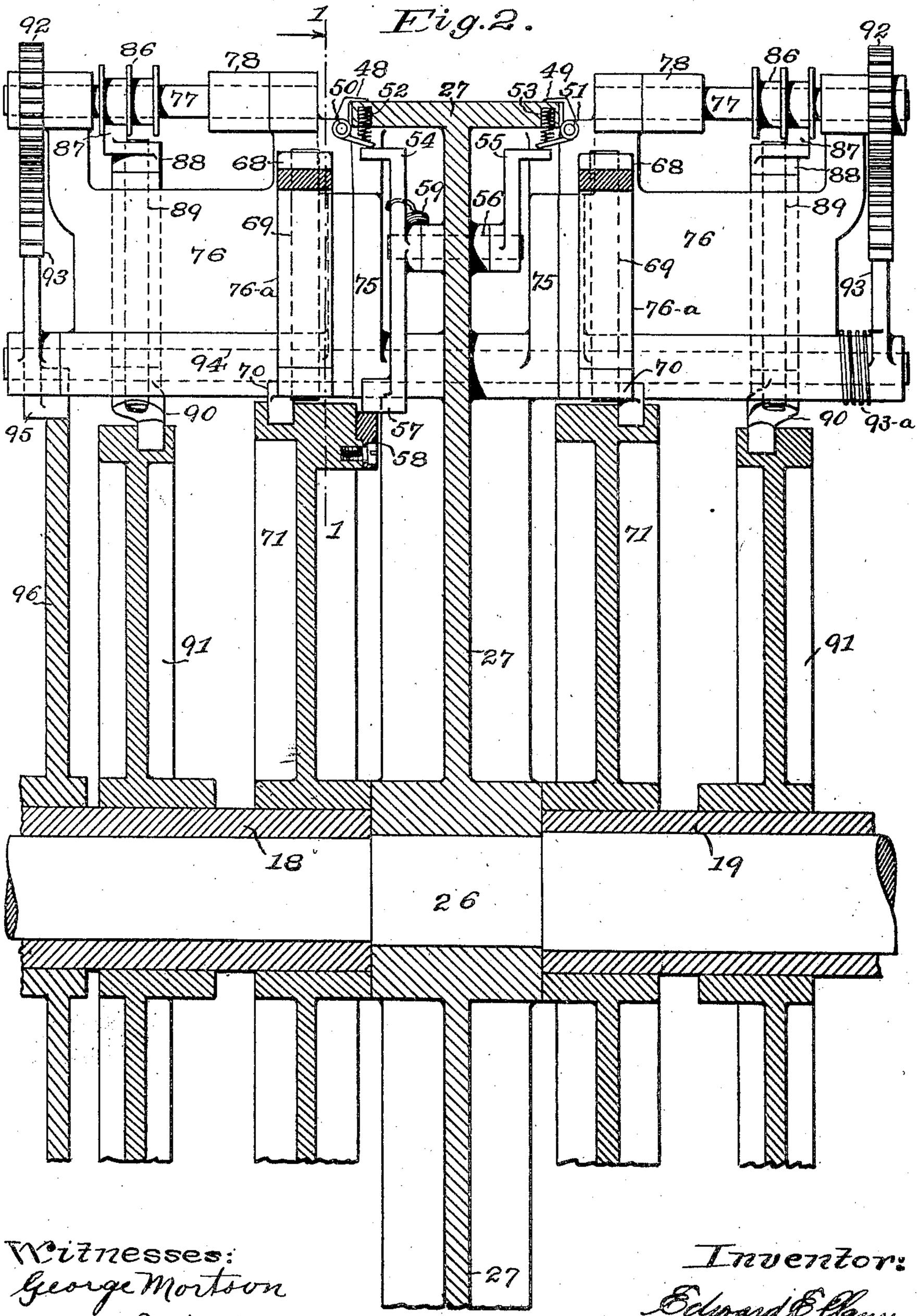
6 SHEETS—SHEET 2.

Fig. 2.



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6 SHEETS—SHEET 3.

Fig. 4.

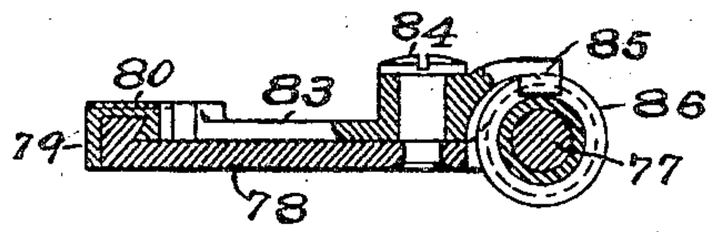


Fig. 5.

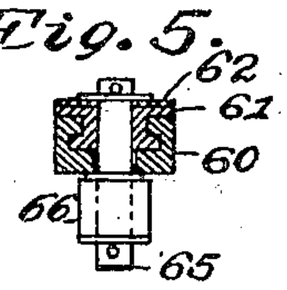
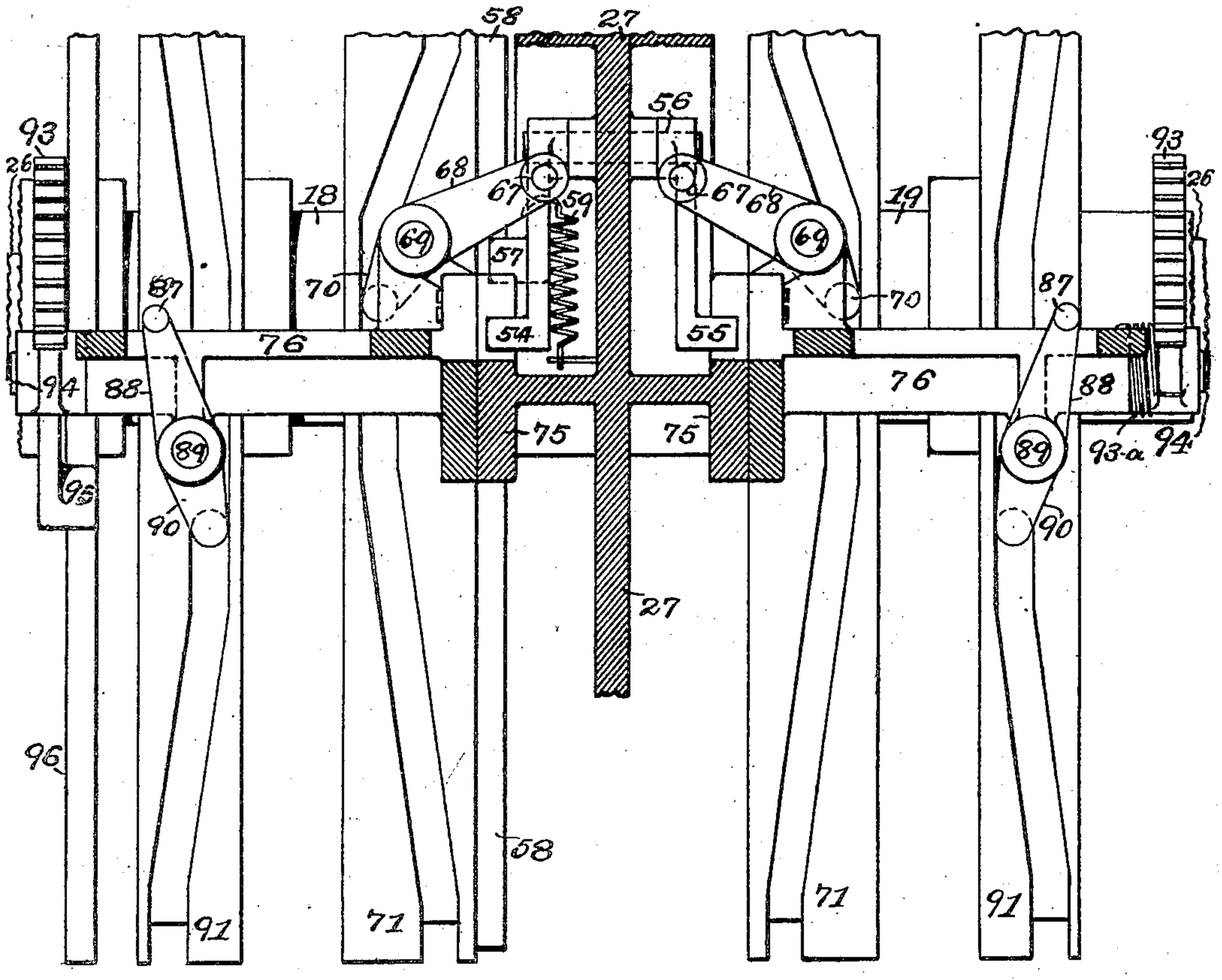


Fig. 3.



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6 SHEETS—SHEET 4.

Fig. 7.

Fig. 6.

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6 SHEETS—SHEET 5.

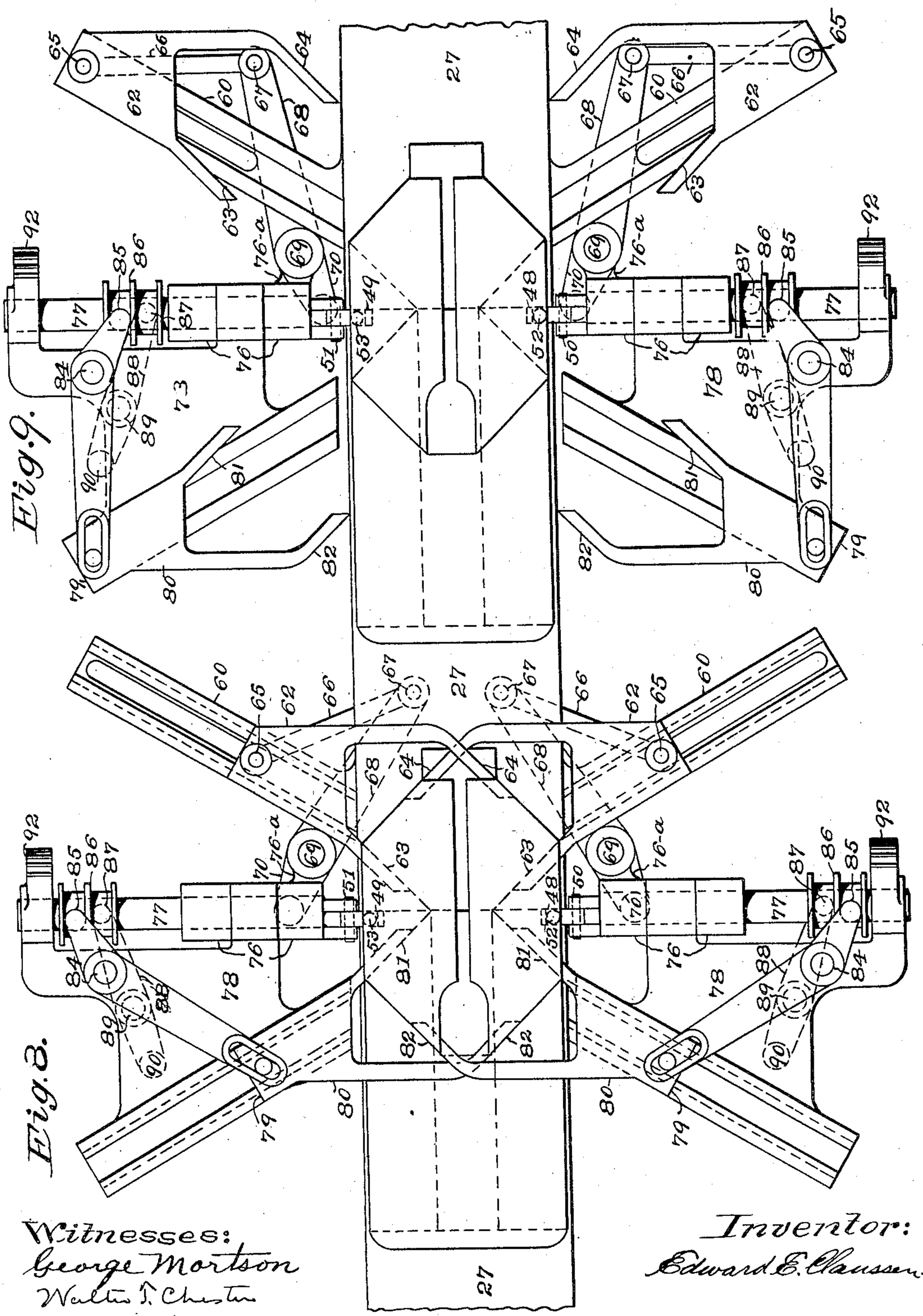

Fig. 9.

Fig. 8.

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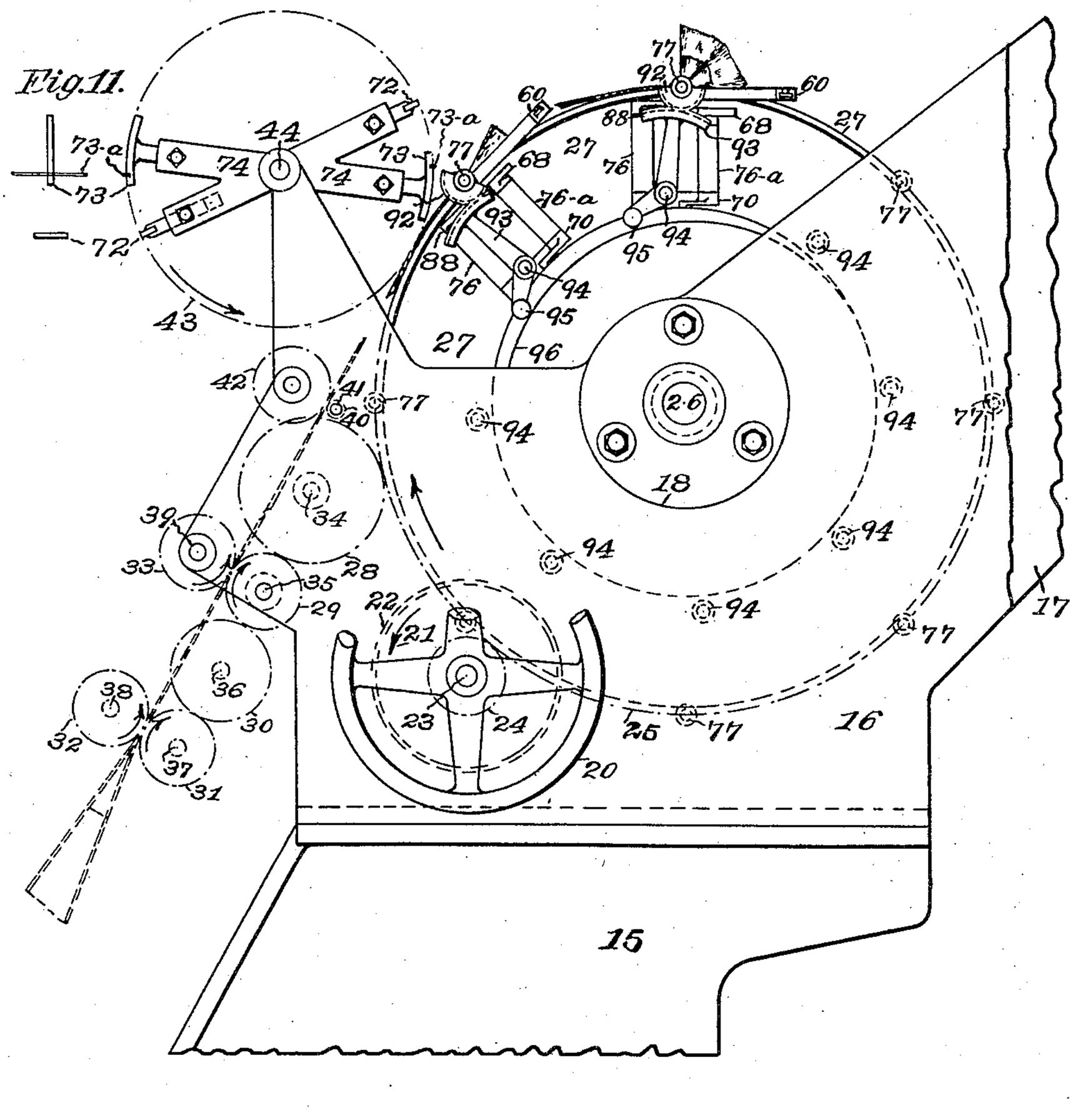
6 SHEETS—SHEET 6.

Fig. 10.

Fig. 11.



Witnesses:
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UNITED STATES PATENT OFFICE.

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PAPER-BAG MACHINE.

No. 925,295. Specification of Letters Patent. Patented June 15, 1909.

Application filed October 12, 1906. Serial No. 338,621.

To all whom it may concern:

Be it known that I, EDWARD EMIL CLAUSSEN, a citizen of the United States of America, and a resident of Hartford, in the county of Hartford and State of Connecticut, with a post-office address in the above place, have invented certain new and useful Improvements in Paper-Bag Machines, of which the following is a specification.

This invention relates to apparatus for automatically manufacturing paper bags from tucked paper tubes, and as herein shown and described is especially adapted to manufacture those bags known in commerce as "square-bottom" paper bags, the same being a bag comprising a tucked paper tube, the right-angle inwardly projecting folds and the rectangular bottom folded back upon the tube.

The object of this invention is to provide simple, reliable, accurate and rapid means for unfolding the tubular blank and forming the diamond on the blank.

To carry out the invention, I have devised a novel folding instrument or device comprising a pair of straight edges or fingers with fold defining edges. The two fingers of each device are rigidly connected together and are so relatively arranged and spaced apart that one may enter the side tuck of the blank to be folded to define one of the side pocket fold lines formed in the tucked portion of the blank while the other finger projects into the open mouth of the blank to define the margin line of the diamond fold parallel to the side pocket line defined by the other finger or straight edge. Preferably, as disclosed, there are two pairs of these folding devices employed in conjunction with each folding bed. The two devices of each pair are located on opposite sides of the folding bed, and suitable mechanism is provided for oscillating one pair of the devices bodily about an axis practically coincident with the primary transverse fold line of the blank. The folding devices which are thus oscillated serve to open the end of the blank and to define the fold lines formed in the upper half of the blank, while the other pair of folding devices serve to define the fold lines formed in the lower half of the blank. Folding devices of this character may be effectively operated by comparatively simple operating mechanism, and their operation on the blank is such that the diamond fold is readily formed in such a manner as to eliminate distortions and wrinkles, thus insuring perfect bags and avoidance of waste product.

I will give a detailed description of the accompanying drawings which form a part of this specification.

Figure 1 represents an outside elevation of the cylinder being shown in section on line 1—1 on Fig. 2 looking in the direction of the arrow. Fig. 2 is a sectional end elevation on line 2—2 on Fig. 1. Fig. 3 is a sectional plan view taken on the broken line 3—3 on Fig. 1. Figs. 4 and 5 are sectional end views taken on the lines 4—4 and 5—5 respectively, looking in the direction of the arrows on Fig. 6. Figs. 6 and 7 are plan views of the top of the cylinder showing the diamond of the bag completed and the straight-edges respectively, inserted and withdrawn from the bag blank. Figs. 8 and 9 are plan views of the top of the cylinder of a modified form. The movement of the plates being at 60 deg. to the longitudinal median center line instead of 45 deg. as shown in Figs. 6 and 7. Fig. 10 represents the right-hand side elevation of the machine. Fig. 11 shows an end view of the presser feet.

The directions of the movements of parts are shown by adjacent arrows, and the positions of the different folding instrumentalities are shown irrespective of the relations of the positions to the cams which move these instrumentalities, it being sufficient for the purpose of this description to say, that the cams are properly laid out and cut to produce the operations of the folding instrumentalities at the proper time and to the required extent.

The bed 15 which supports the various frames and brackets of the machine, is adapted to support the side frames 16 and 17, of well known construction and each side frame carries the bushings 18 and 19 respectively, which are provided with flanges bolted securely thereto. The hand wheel 20 (see Fig. 10) turns in the direction of the arrow 21, together with the pulleys 22, which are fixed upon the pulley-shaft 23, which is journaled in the side frames 16 and 17 crosswise of the machine. Upon the shaft 23 is also mounted the gear 24, which meshes into the cylinder gear 25, fastened to the cylinder-shaft 26 and journaled in the bushings 18 and 19 which carry the cylinder 27. The cylinder-gear meshes into the gear 28 which

engages the gear 29 and sets the train of gearing 30, 31, 32 and 33 in motion. The gears 28, 29, 30, 31, 32 and 33 are mounted on the shafts 34, 35, 36, 37, 38 and 39 respectively. The gear 28 also meshes into the gear 40 on the shaft 41 and has on the opposite side another gear of equal diameter which meshes into the gear 42. All these are similar in construction to those shown in Patent No. 813,280 granted to me and dated Feb. 20th, 1906. The cylinder gear 25 also meshes into the gear 43 on shaft 44 and by the means just described the whole machine is set into motion in the direction indicated by the arrows. For sake of clearness I have shown the gears 24, 25, 28, 29, 30, 31, 32, 33, 34, 40, 42 and 43 in dash and dotted lines, but they are understood as having teeth cut around their peripheries.

The mechanism for forming the diamond fold on the tucked paper tube blank will now be described and consist of the following: As previously described the cylinder 27 is mounted on and is rotated by the cylinder shaft 26 and in the machine illustrated is provided with eight folding mechanisms, but a larger or a smaller number might be provided, according to the size of the machine and these folding mechanism are distributed at equal distances around the periphery of the cylinder. Each of the eight folding mechanisms receive motion from the same set of cams and they are all identical in construction and I will therefore describe only one set thereof. As the paper blank is delivered onto the cylinder the same is clamped thereto by the pincers 48 and 49 which pass over both plies of the tube and they are located in such a position that the forward edges correspond with the primary transverse folding line of the bag blank as clearly shown in Figs. 6, 7, 8 and 9. The pincers 48 and 49 are pivoted on studs 50 and 51 have inwardly projecting arms upon which the springs 52 and 53 press and keep the same in a closed position upon the top of the cylinder. The same are caused to be opened by the arms 54 and 55 pinned upon the shaft 56 and the arm 54 carries an extension which carries the cam-roll 57 engaging the stationary cam 58 and as the cylinder is rotated the pincers are opened according to the timing of the cam, the spring 59 always keeping the cam roll spring pressed against the cam. Integral with and projecting from each side of the cylinder are the slide-ways 60 adapted to receive the slides 61 upon which are fastened the folding devices or implements, which, in the form shown, consist of plate 62 having fingers 63 and 64. These fingers I prefer to call straight edges, as each of the fingers has a fold defining side edge which preferably is rectilinear, though, of course, it will be understood that this edge need not be absolutely straight. It will, of course, be understood that the fold defining edges of the fingers 63 and 64 are the parallel right hand side edges of the fingers as they appear in Figs. 6, 7, 8 and 9. The fold defining edges of the fingers 63 and 64 of each plate define the one, the inside triangular fold line, at one side of the blank, and the other, the parallel diamond margin fold line, at the other side of the blank. The fold defining edges of the fingers 63 and 64 are each at an angle of substantially forty-five degrees with the center median line of the cylinder or the side edges of the blank. The fold defining edges of the fingers 63 and 64 of each folding device at one side of the blank make angles of substantially ninety degrees, therefore, with the edges of the corresponding folding devices on the other side of the blank. The vertical distance *a* between the fold defining edges of the fingers 63 and 64 of each folding device is determined by the width of the blank worked upon. It will be observed from the dotted lines of Fig. 7 that an extension of the fold defining edge of each finger 63 passes through the intersection of the primary transverse fold line with the inner edge of the tuck at one side of the blank, while an extension of the fold defining edge of the corresponding finger 64 intersects an extension of the primary transverse fold line at a distance beyond the far side edge of the blank which is equal to the depth of the tuck, as is shown by the dotted lines *b*, *c* in Fig. 7. From this it is seen that the distance *a* is equal to the length of each leg of a right angled isosceles triangle of which the hypotenuse is equal to the width of the blank. From this it may be determined by simple geometry that the distance *a* is equal to the width of the blank divided by the square root of two.

The means for reciprocating the slides 61 with the plates 62 and its straight-edges is as follows: Passing through the slide 61 is the stud 65 which is engaged by the connecting rod 66 and which has its other end jointed to the pivot 67, of the arm 68 on shaft 69, journaled in a hub 76[a] of the bracket 76, said shaft having a cam arm provided with a cam roll engaging a groove in the cam 71, held on the stationary bushings 18 and 19. As the cylinder rotates the slides with the plates 62 and their straight edges are reciprocated. The straight-edges 63 and 64 are very thin and the points or ends of 64 are bent slightly one above the other so that they pass one another when they enter into the bag.

To insure that the straight edges 64 properly enter into the bottom forming end, I have provided the presser foot 72 (see Figs. 11 and 12) adjustably held in the head 73 and fastened on the shaft 44, which is journaled crosswise to the machine in the

side frames 16 and 17. The gear 43 is timed in relation to the cylinder gear 25 in such a manner, that each blank is slightly pressed by the presser foot to the cylinder at the point *d*, as shown on Figs. 6 and 7, thereby giving the straight edges 64 a clear and unobstructed entrance into the mouth of the bag and as the rotation is continued the presser-heel 73 which is also adjustably mounted in the head 74, slightly presses onto the tube permitting the straight edges 63 to enter between the tucks of the paper tube.

The presser heel 73 is provided with the creaser blade 73ª, which creases the bag blank at the primary transverse folding line and which corresponds to the center-line of the oscillating shafts 77.

The mechanism which operates above the paper bag blank will now be described.

Integral with and on each side of the cylinder 27, are the flanges 75, to which are secured the brackets 76 carrying at their upper ends the bearings for the oscillating shafts 77, which are located in such a manner that their center lines correspond with the primary transverse folding line of the bag blank. Secured to the oscillating shafts are the oscillating heads 78, which are provided with guide-ways on which reciprocate the slides 79, to which are secured folding devices or implements. These are in the form of plates 80, provided with the two parallel thin straight edges 81 and 82. The plates 62 and 80 with their corresponding straight edges 63 and 81 and also 64 and 82 are exactly alike as far as the straight edges are concerned. The straight edges 81 enter between the tucks of the tube, the straight edges 82 enter into the bottom forming end and below the upper ply of the paper bag blank when the oscillating heads 78 are in their forward position as indicated by the dash and dot line *e* of Fig. 1.

The plates 80 with their parallel straight-edges 81 and 82 are reciprocated as follows: The slides 79 are provided with racks which engage the sectors 83, on pivots 84, held on the oscillator-heads 78, and those sectors have projecting arms which are provided with rolls 85, which engage between the inner and central collars of the sleeves 86. Between the central and outer collars of the sleeves 86, are the roll 87, on the arms 88 fastened on shafts 89 journaled in hubs of the brackets 76, and those shafts carry on the opposite ends the cam arms 90, the cam rolls of which engage the cams 91 held on the stationary bushings 18 and 19. The oscillating shafts 77 have secured on their outer ends the sectors pinions 92, meshing into the sectors 93, held on the shaft 94, and on the right hand side of the machine the sector 93 has an arm with a cam roll 95, engaging the cam 96, which is fastened and securely held on the bushing 18. As the cylinder is rotated the head 78 is oscillated from the position as shown by the dash and dotted line *e* of Fig. 1 to the position as shown in the left hand corner of the same figure.

In Figs. 8 and 9 I have shown a modification in which the angularity of the movement of the slides is to 60 degrees instead of 45 degrees as shown in Figs. 6 and 7. The angle of the straight-edges is however the same viz., 45 degrees to the central median line of the cylinder, and as the construction and operation is otherwise identical no further description is necessary.

The operation of the machine is as follows:—The roll of paper which is to be converted into square-bottom paper bags, is mounted at the front end of the machine and as the web of paper passes along the same paste is applied and then the paper passes around the die and guide-rolls, is folded around the former and thereby converted into a continuous tucked paper tube, which is guided into the bite of the drawing-rolls, which feed the tube into the machine. The tube is then cut into lengths of sufficient size to form a completed square-bottom paper bag, delivered into the bite of the conveyer-roll and conveyer-sector, which conveys the bag blank to the cylinder. As the advancing bottom-forming end of the blank moves toward the cylinder, the front end of the lower ply is pressed at *d* (see Fig. 6) by the presser foot 72, to the cylinder and at this instant the plates 62, with their straight edges 63 and 64, move toward the bag blank the straight edges 64 passing over the lower ply of the tube, simultaneously the plates 80 with the straight edges 81 and 82 are also caused to be moved toward the blank while the oscillator-heads 78 are in the position indicated by the line *e* of Fig. 1, as the blank is carried a little more forward the straight edges 63 and 81 enter between the tucks. The blank which has been previously transversely creased by the creaser blade and the pincers 48 and 49 having closed onto the blank the series of straight edges are then caused to complete their movement to the proper depth into the blank. The oscillator heads 78, on shafts 77, are then caused to be oscillated by means of the sector pinions 92, sectors 93 and cam 96 thereby unfolding the tucked paper tube and converting the same into the diamond form as clearly shown in Fig. 6. The series of straight edges are then withdrawn and the bag completed by turning over the end flaps, which form no part of this invention, by any of the mechanism well known in the art.

What I claim and desire to secure by Letters Patent is:—

1. An implement for diamond folding tucked bag blanks of predetermined width having two rigidly connected but spaced apart portions adapted for simultaneous en-

trance, one, into the tuck at one side of the blank and the other into the mouth of the blank, each of said portions being provided with a fold defining edge at the same side of the portion as, and parallel to, the fold defining edge of the other portion, the one for defining an inside triangular fold line on said one side of the blank and the other the parallel diamond margin line at the other side of the blank.

2. An implement for diamond folding a bellows sided bag blank of predetermined width, having a pair of fingers connected together and provided each with a fold defining edge at the same side of the finger as and parallel to the fold defining edge of the other finger, and having the distance between said edges equal to said bag width divided by the square root of two.

3. A machine for diamond folding tucked bag blanks, including in combination a folding bed, a pair of folding devices, each provided with a pair of spaced apart fold defining straight edges, means for moving said devices into and out of the blank engaging position in which one straight edge of one device enters one side tuck of the blank, and the corresponding straight edge of the other device, the other side tuck of the blank, and the other straight edges extend into the open mouth of the blank, and mechanism cooperating with said devices and the bed to form the diamond fold.

4. A machine for diamond folding tucked bag blanks, including in combination a folding bed, a pair of folding devices, each provided with a pair of spaced apart fold defining straight edges, means for moving said devices into and out of the blank engaging position in which one straight edge of one device enters one side tuck of the blank, and the other straight edges extend into the open corresponding straight edge of the other device the other side tuck of the blank, and the mouth of the blank, means for turning said folding devices bodily about an axis substantially coincident with the primary transverse fold line of the blank, and means coöperating with said devices and the bed to form the diamond fold.

5. A machine for diamond folding tucked bag blanks, including in combination a folding bed, two pairs of folding devices, each folding device having a pair of spaced apart fold defining straight edges, means for moving said folding devices into and out of the blank engaging position in which one straight edge of one device of each pair enters one side tuck of the blank and the corresponding straight edge of the other device of that pair enters the other side tuck of the blank, and the other straight edges of the devices extend into the open mouth of the blank, and means for oscillating one pair of said folding devices bodily about an axis substantially coincident with the primary transverse fold line of the blank.

6. A machine for diamond folding tucked bag blanks, including in combination a rotary blank carrier having a folding bed, eight fold defining straight edges mounted on the blank carrier and movable relatively thereto into and out of an operative position in which they extend over the outline of a blank on said folding bed, and adapted when in said position, two to project into each side tuck of the blank and engage the blank therein along the inside triangular pocket lines, and the other four to project into the mouth of the blank and engage it along the four diamond margin lines parallel to said inside pocket lines, means for moving said straight edges into and out of said operative position, and means for rotating the straight edges engaging the blank at the fold lines formed in the upper half of the blank about an axis substantially coincident with the primary transverse fold line of the blank.

7. A machine for diamond folding tucked bag blanks including in combination a blank carrier provided with a folding bed, four straight edges mounted on said carrier and movable relatively thereto into and out of the position in which they extend over the outline of a blank on the folding bed and adapted when in said position to enter one into each side tuck of the blank to define an inside triangular pocket line therein, and the other two into the mouth of the blank to define the diamond margin lines parallel to the side pocket lines defined by the straight edges entering said side tuck, means for moving said edges into and out of said position, and means coöperating with said straight edges and the bed to form the diamond fold.

8. A machine for diamond folding tucked bag blanks, including in combination a folding bed, guideways at each side of the folding bed extending at an angle to the primary transverse fold line of the blank, folding devices sliding in said guideways and provided each with a straight edge adapted to project into the adjacent side tuck of the blank, and a straight edge adapted to project into the far side of the mouth of the blank, means for moving said folding devices in said guideways, and means coöperating with said folding devices and the folding bed for forming the diamond fold.

9. A machine for diamond folding tucked bag blanks, including in combination a folding bed, guideways at each side of the folding bed extending at an angle to the primary transverse cross fold line of the blank, folding devices sliding in said guideways and provided each with a straight edge adapted to project into the adjacent side tuck of the blank, and a straight edge adapted to project into the far side of the mouth of the blank, means for rotating said folding de-

vices about an axis substantially coincident with the primary transverse fold line of the blank, and means coöperating with said folding devices and the folding bed for forming the diamond fold.

10. A machine for diamond folding tucked bag blanks, including in combination a folding bed, a pair of guideways at each side of the folding bed, each extending at an angle to the primary transverse fold line of the blank, folding devices mounted one in each guideway, each folding device having a pair of straight edges, one shaped to project into the side tuck of the blank and the other into the far side of the mouth of the blank, means for moving said folding devices in said slideways, and means for turning one slideway and folding devices carried thereby at each side of the blank about an axis substantially coincident with the primary transverse fold line of the blank.

11. A machine for diamond folding tucked bag blanks, including in combination a folding bed, a pair of folding plates arranged one on each side of the folding bed and each having a pair of fold defining fingers, means for moving said plates into and out of the blank engaging position in which one finger of each plate enters the adjacent side tuck of the blank, and the other finger of the same plate projects into the far side of the mouth of the blank, and mechanism coöperating with said plates and the bed to form the diamond fold.

12. A machine for diamond folding tucked bag blanks, including in combination a folding bed, a pair of folding plates arranged one on each side of the folding bed and each having a pair of fold defining fingers, means for moving said plates into and out of the blank engaging position in which one finger of each plate enters the adjacent side tuck of the blank and the other finger of the plate projects into the far side of the mouth of the blank, means for turning said plates bodily about an axis substantially coincident with the primary transverse fold line of the blank, and mechanism coöperating with said plates and the bed to form the diamond fold.

13. A machine for diamond folding tucked bag blanks, including in combination a rotating blank carrier provided with a folding bed, a pair of folding devices mounted on the blank carrier and located one on each side of the folding bed and each provided with a pair of spaced apart fold defining straight edges, stationary cams and intermediate mechanism between said cams and folding devices for moving the latter into and out of the blank engaging position in which one straight edge of one device enters one side tuck of the blank, and the corresponding straight edge of the other device enters the other side tuck of the blank, and the other straight edges extend into the open mouth of the blank, and mechanism coöperating with said devices and the bed to form the diamond fold.

14. A machine for diamond folding tucked bag blanks, including in combination a rotary blank carrier having a folding bed, a pair of folding devices mounted on the blank carrier and located one at each side of the folding bed and each provided with a pair of spaced apart fold defining straight edges, stationary cams and intermediate mechanism between the cams and the folding devices for moving said devices into and out of the blank engaging position in which one straight edge of one device enters one side tuck of the blank, and the corresponding straight edge of the other device, the other side tuck of the blank, and the other straight edges enter the open mouth of the blank, and for turning said folding devices bodily about an axis substantially coincident with the primary transverse fold line of the blank, and means coöperating with said devices and the bed to form the diamond fold.

15. A machine for diamond folding tucked bag blanks, including in combination a rotary blank carrier having a folding bed, a presser foot mounted on the blank carrier, folding devices mounted on the blank carrier and located one on each side of the folding bed, means for moving said folding devices into and out of the blank engaging position in which one straight edge of each device enters the adjacent side tuck of the blank, and the other straight edges enter the open mouth of the blank while the presser foot presses the lower ply of the blank against the folding bed, means for operating the presser foot, and means coöperating with said devices, presser foot, and bed to form the diamond fold.

16. A machine for diamond folding tucked bag blanks, including in combination a rotary blank carrier having a folding bed, pivotally disposed pincers mounted on the folding bed and arranged so that their forward edges are adapted to engage the blank along the primary transverse fold line thereof, means for opening and closing said pincers at predetermined intervals, two pairs of oppositely disposed folding plates, each provided with a pair of straight edges, means for moving said plates into and out of the operative position in which one straight edge of each device projects into the adjacent side tuck of the blank, and the other straight edge projects into the open mouth of the blank, and means for rotating one pair of said plates bodily about an axis substantially coincident with the primary transverse fold line of the blank.

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