No. 847,194. PATENTED MAR. 12, 1907.

W. A. LORENZ.

PAPER BAG MACHINE.

APPLICATION FILED NOV. 12, 1900.

5 SHEETS—SHEET 1.

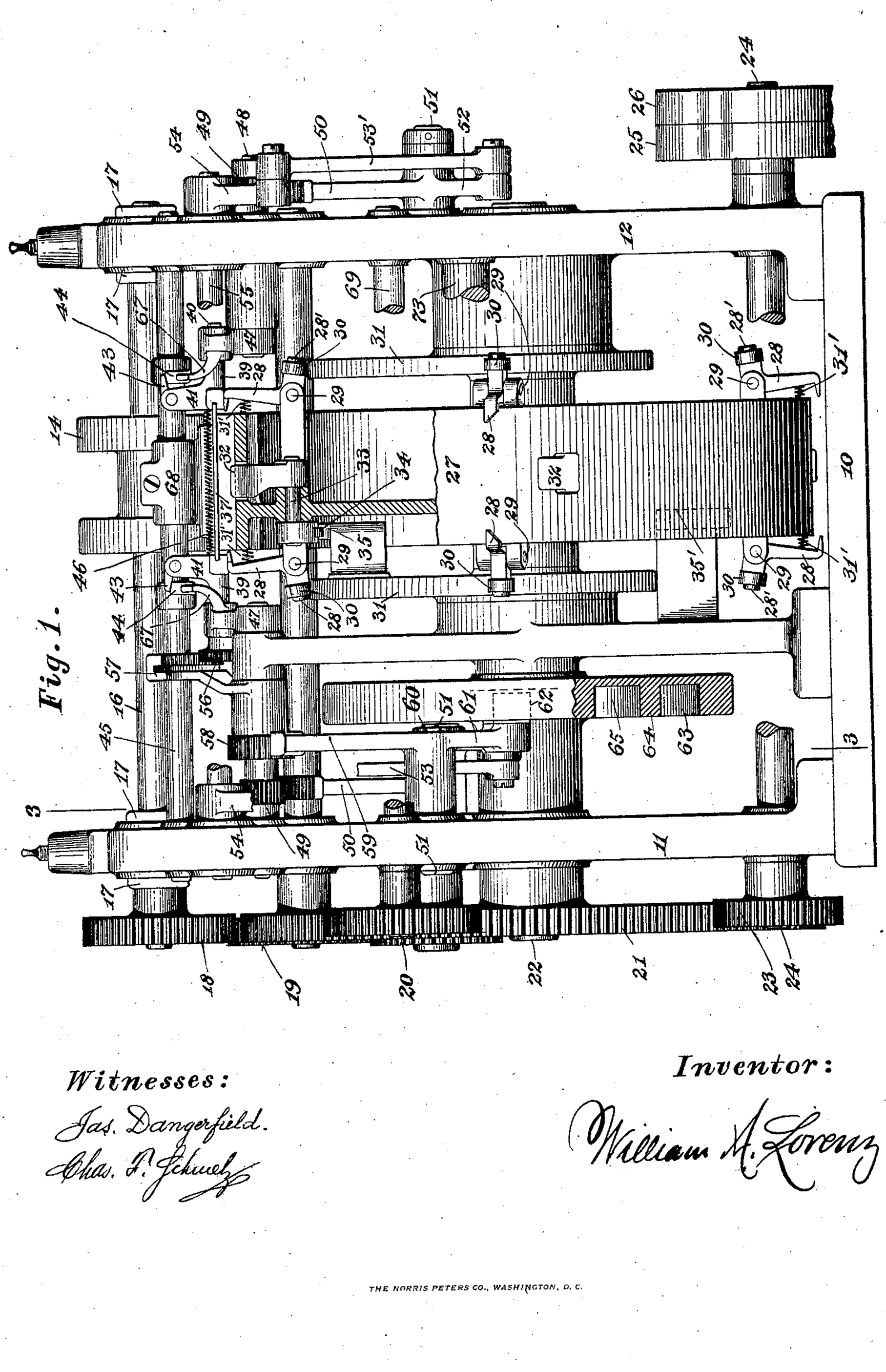

Fig. 1.

Witnesses:

Jas. Dangerfield.

Chas. F. Schuelz

Inventor:

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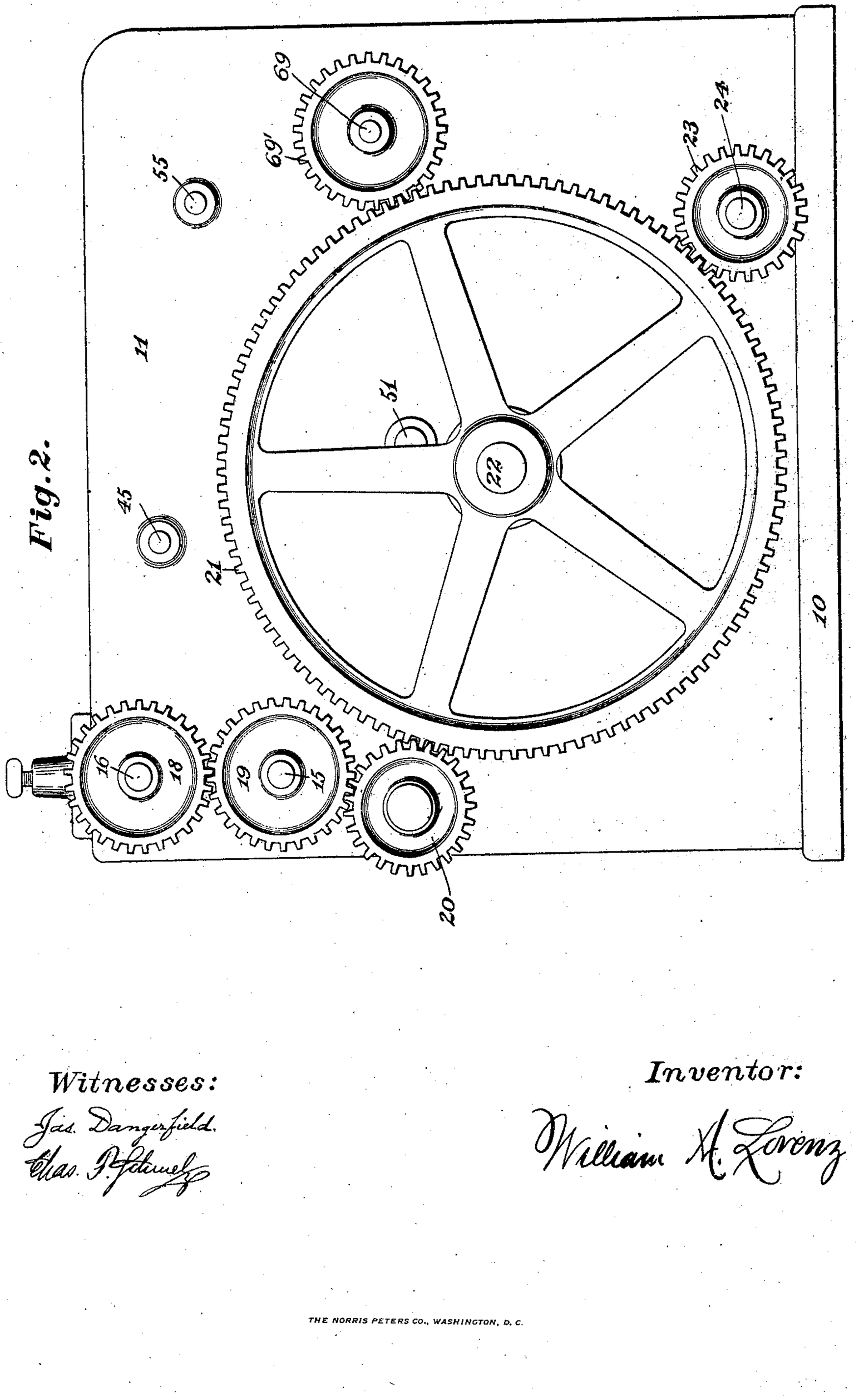
5 SHEETS—SHEET 2.

Fig. 2.



Witnesses:

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Chas. P. Stowell

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5 SHEETS—SHEET 3.

Fig. 3.

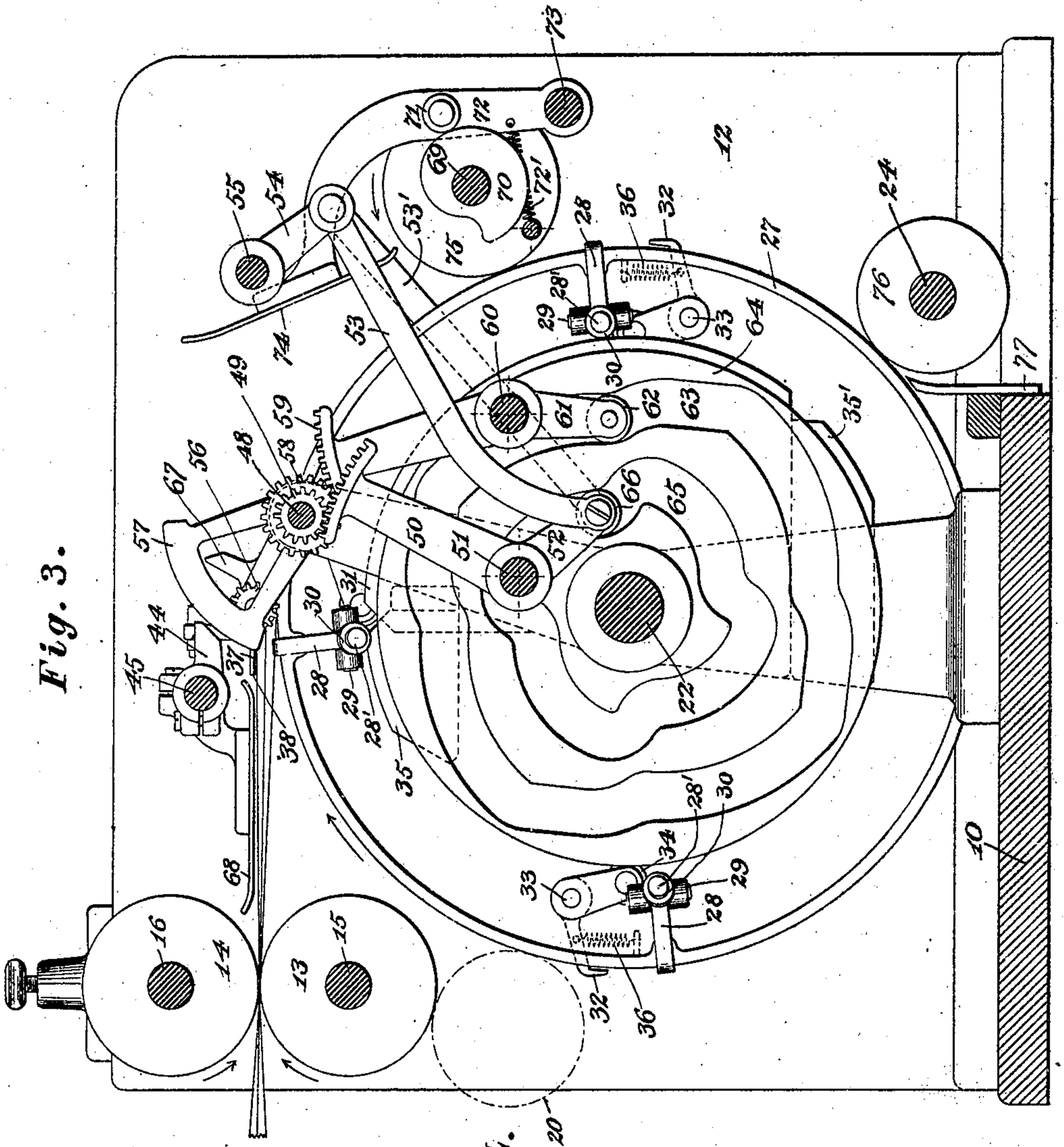
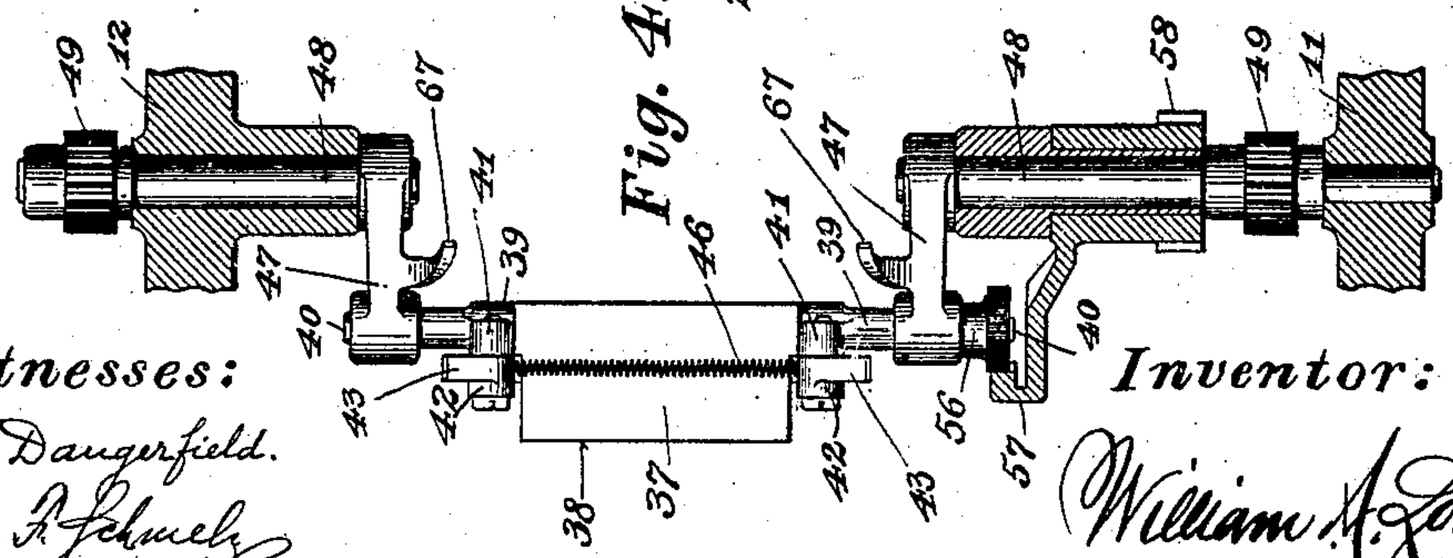


Fig. 4.



Witnesses:

Jas. Daugerfield.

Chas. F. Schmeltz

Inventor:

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5 SHEETS—SHEET 4.

Fig. 6.

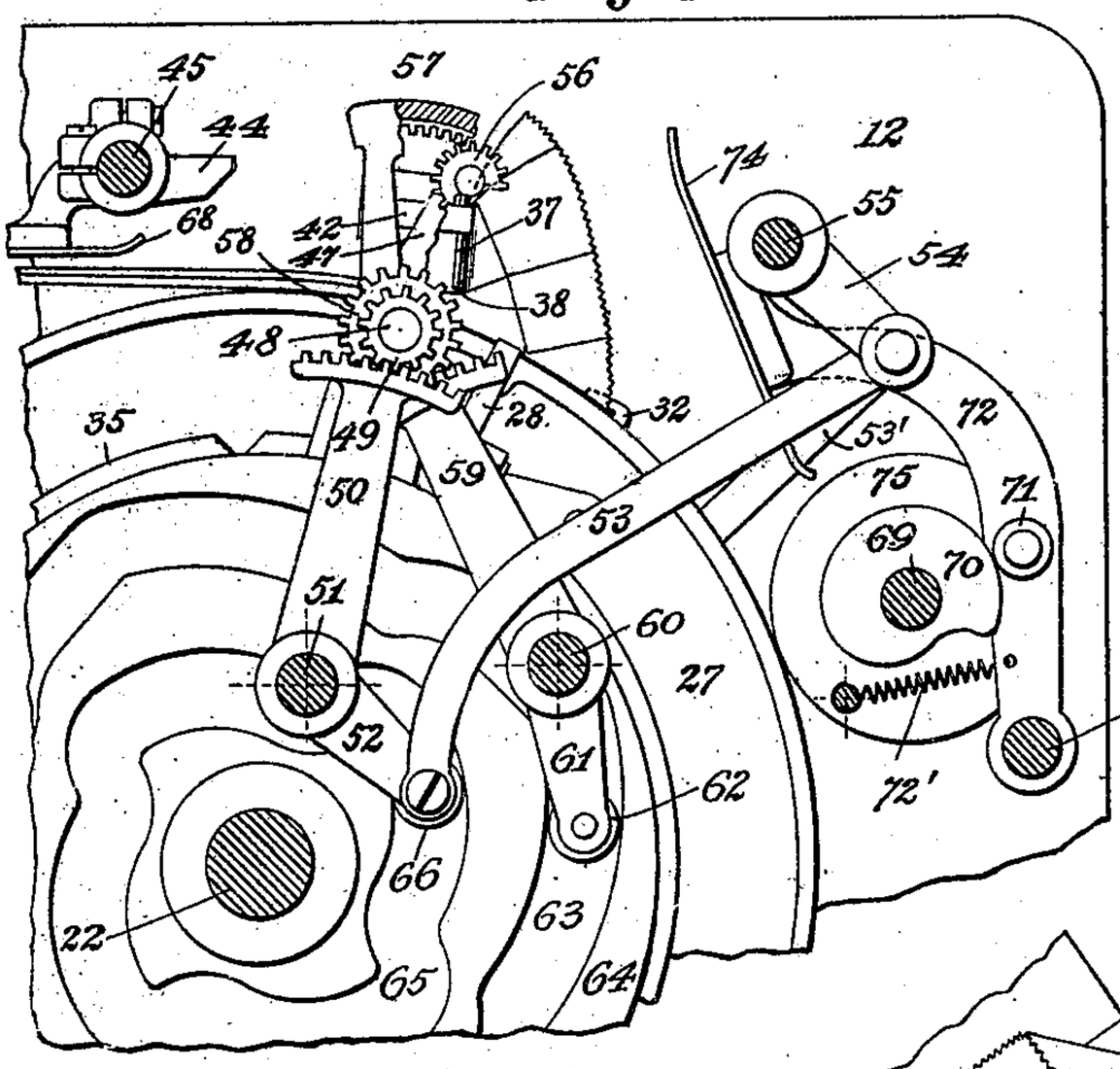

Fig. 7.

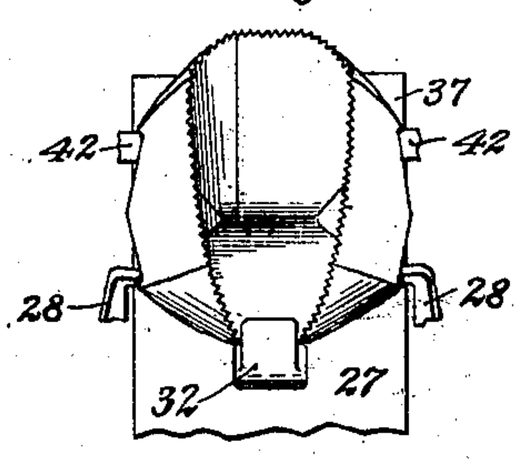

Fig. 5.

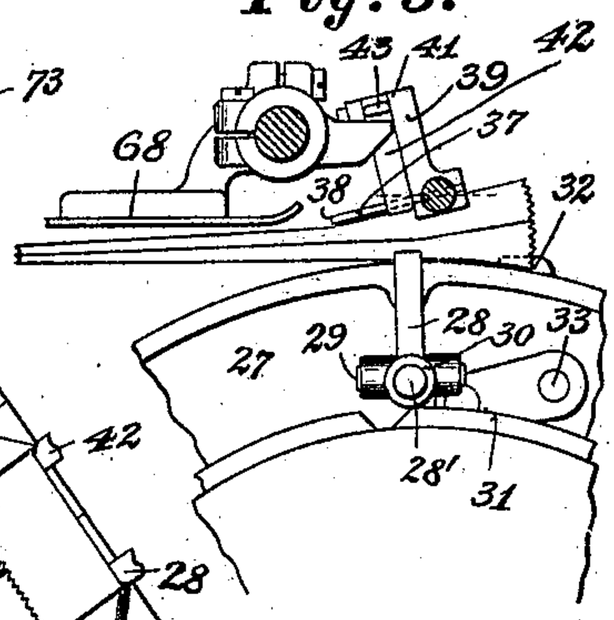

Fig. 8.

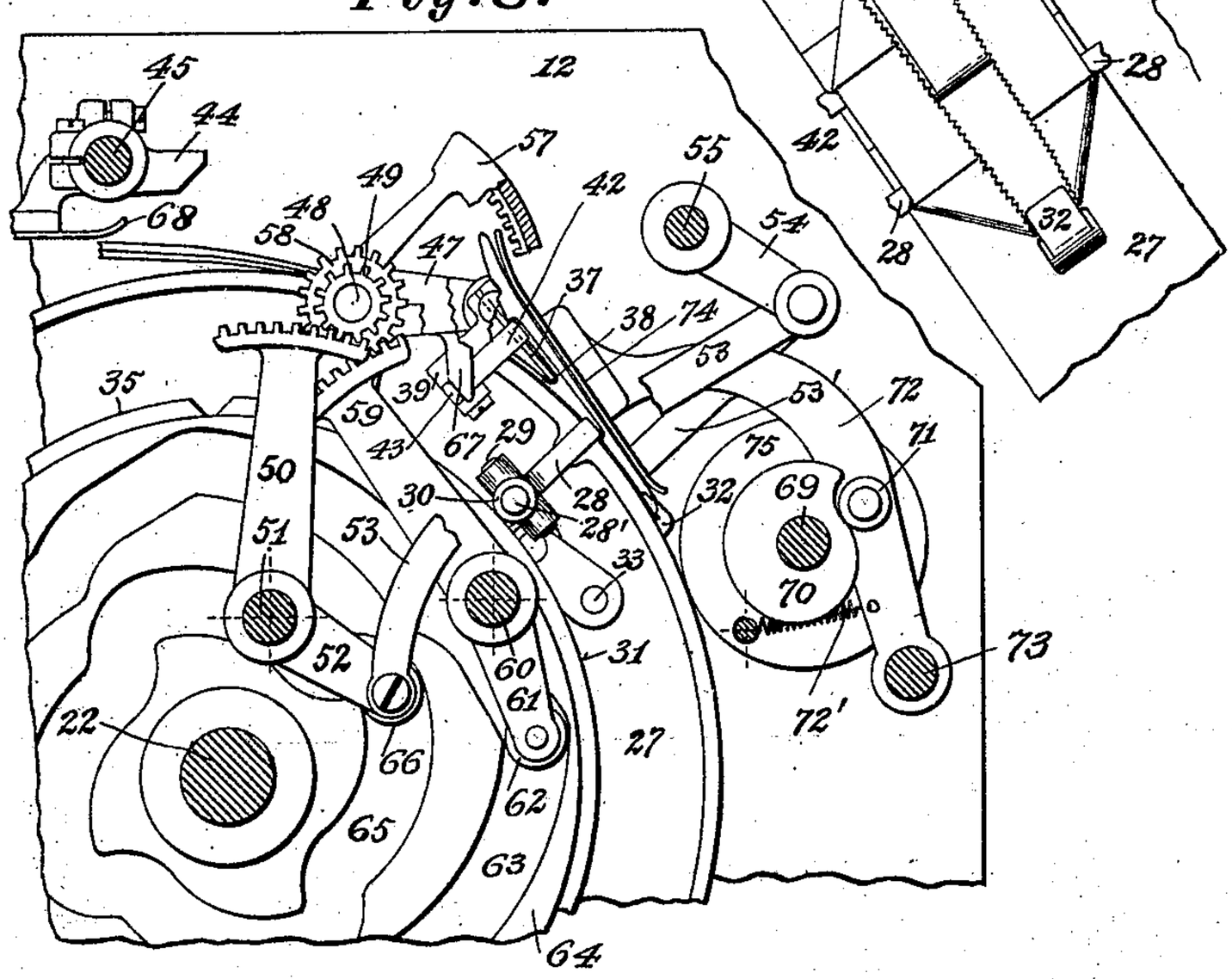

Fig. 9.

Witnesses:

Jas. Dangerfield.

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No. 847,194. PATENTED MAR. 12, 1907.

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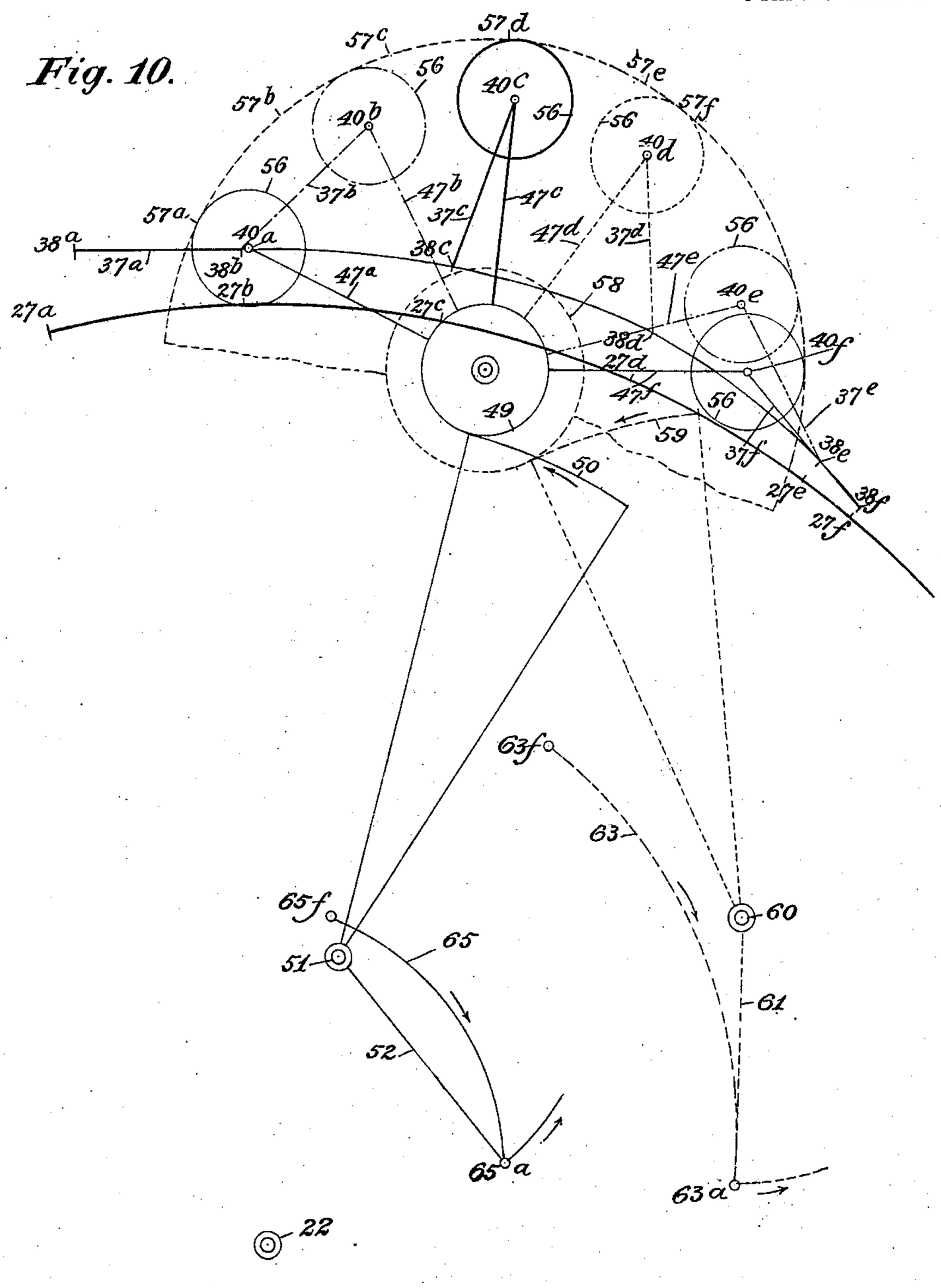
APPLICATION FILED NOV. 12, 1900.

5 SHEETS—SHEET 5.

Fig. 10.



Witnesses:

Jas. Dangerfield.

Chas. F. Schmeltz

Inventor:

William A. Lorenz.

UNITED STATES PATENT OFFICE.

WILLIAM A. LORENZ, OF HARTFORD, CONNECTICUT, ASSIGNOR TO UNION PAPER BAG MACHINE COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF PENNSYLVANIA.

PAPER-BAG MACHINE.

No. 847,194. Specification of Letters Patent. Patented March 12, 1907.

Application filed November 12, 1900. Serial No. 36,177.

To all whom it may concern:

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

This invention relates to paper-bag machines, and more especially to that class thereof in which square-bottom bags are formed from bellows-sided or tucked tubing; and it has for its object the provision of a machine of this type whereby the so-called "diamond fold," including the associated complex triangular folds which must be formed in the bellows sides of the tubing, is formed in a rapid and easy manner preparatory to having its flaps supplied with paste and subsequently folded to complete the bag.

My invention comprises as one of its features a blank-folding member having a defining edge and which is pivoted at a point remote from said edge and mounted for movement toward and away from the blank-supporting surface of a suitable carrier upon which the blank to be folded is retained and which is at the same time advanceable with the blank-carrier adapted for coöperation with the blank-folding member to open out the open end of the blank in a manner to be hereinafter set forth.

My invention has for one of its objects the combination, with a folding member as just described, of a carrier in which the folding member is mounted for oscillation and which is adapted for movement so as to cause said defining edge to advance with the blank-carrier during the diamond-forming operation.

My invention includes as one of its features a carrier supporting the blank-folding member and pivoted eccentrically relatively to the axis of the blank-carrier, and preferably near the blank-supporting surface thereof.

My invention has, furthermore, for its object the provision of a machine of this class in which a folding member of the nature above mentioned is coöperatively mounted with a traveling blank-carrier having a fixed axis, while the defining edge of the blank-folding member is caused to move in a variant path relatively to the blank-supporting surface of the blank-carrier and whereby said edge is maintained at a distance from the blank-carrier while the diamond of the bag is being formed.

In the drawings accompanying this specification, and in which similar characters designate similar parts, Figure 1 is a front view of a machine constructed in accordance with my invention. Fig. 2 is a side view thereof. Fig. 3 is a vertical section taken on line 3 3, Fig. 1. Fig. 4 is a top view of the blank-folding member and its mountings. Fig. 5 is a fractional side view of the blank-carrier, illustrating the blank-folding member and the carrier near their initial position and when commencing to open out the end of the blank. Fig. 6 illustrates the parts in position when the blank has been opened out sufficiently to assume what is generally called the "box form." Fig. 7 is a front view of the blank shown in Fig. 6. Fig. 8 illustrates the parts in position when the diamond has been substantially completed, and Fig. 9 is a front view of the blank shown in Fig. 8, and Fig. 10 is a diagram illustrating the movement and operation of the blank-folding member and the defining edge during the diamond-forming operation.

In the drawings, 10 designates the bed-plate, to which are secured a pair of upright side frames 11 and 12, in which the several parts for operating the various devices are supported. Suitable means are provided for feeding blank or bellows-sided tubing in the machine, such means consisting in the present instance of suitable feed-rollers 13 14, mounted on shafts 15 16, respectively, the latter being journaled in boxes 17, movably held in the side frames and acted upon by suitable springs. (Not shown.) The feed-rollers are caused to coöperate with each other by means of gears 18 and 19, mounted on said shafts, and said feed-rollers may be driven by an intermediate gear 20, journaled on the side frame 11 and obtaining motion from a gear 21, mounted upon the shaft 22, which constitutes the main shaft of the machine and to which movement is imparted by a pinion 23, mounted upon the driving-shaft 24 of the machine, to which power may be applied from any ordinary source—as, for instance, by tight and loose pulleys 25 and 26. (See Fig. 1.) From the feed-rollers the blank or tube is conducted to a suitable car-

rier serving as a support for holding the blank during the bottom or diamond forming operation. This carrier is in the present instance of the rotary type and consists, substantially, of a cylinder, such as 27, mounted on the shaft 22, above mentioned, and provided with a plurality of sets of tuck-holders and front diamond-holders, whereby the successive blanks are engaged and held on the carrier while the diamond is being formed. The tuck-holders for holding the lower ply of the tube on the carrier are designated in the drawings by 28 and are journaled at 29 on the carrier, while they are provided with extensions 28′, on which cam-rollers 30 are journaled. These cam-rollers travel around the periphery of suitable cams 31, which cause the tuck-holders to engage the blank on both sides simultaneously and at the proper time and against the action of springs 31′. The front diamond-holder, for engaging or holding the front end of the lower ply of the tube or blank, is shown herein as a holder 32, journaled at 33 in the web of the carrier and carrying a roll 34, adapted to be engaged by cam portions 35 and 35′, by the former of which said holder will be opened to receive a blank, while the latter, 35′, serves for opening said holder to release the blank at the proper time, a spring 36 being employed for placing said holder over the lower ply of the blank.

The blank-folding member, which, as has above been stated, is connected for coöperation with the carrier, is herein illustrated as a plate, one edge of which serves as a bottom-defining edge and which is mounted for oscillation and reciprocation toward and from and also with the carrier. Furthermore, as has above been stated, my invention has for one of its objects the provision of means whereby the defining edge of the blank-folding member may be caused to travel in a predetermined path—viz, in contact with or at a distance from the carrier, so that as the carrier and blank-folding member coact in opening out the open end of the bag-blank the so-called "inside triangular folds" may be easily developed by stretching out the tucked sides of the tube or blank. The blank-folding member herein shown consists, substantially, of a plate 37, having a defining edge 38 and provided at its sides with brackets 39, having trunnions 40, the axes of which are in alinement with each other and remote from said edge. The brackets 39 have extensions 41, adapted to receive suitable means for engaging the upper ply of the blank and for holding the same against the plate 37. These means consist in the present instance of box-holders 42, pivoted in the extensions 41 and having tailpieces 43 to be engaged for opening the same at the blank-receiving end of the stroke by abutments 44, which may be secured to a fixed shaft or bar 45, held in the side frames. The box-holders may be operated to close against the plate 37 by a suitable spring, such as 46, connected with both holders. The pivots or trunnions 40 of the blank-folding member are in the present instance supported in the ends of arms 47, mounted upon spindles 48, which are journaled in the side frames 11 and 12, both spindles being caused to oscillate in unison by pinions 49, secured thereto and engaged by sectors 50. These sectors are journaled on studs 51, held in the side frames of the machine, and have arms 52, connected by links 53 and 53′ with arms 54, secured upon a rock-shaft 55, constituting a medium for operating both trunnions simultaneously. It should be noted here that the axes of the spindles are disposed eccentrically relatively to the axis of the blank-carrier and more particularly adjacent to the blank-supporting surface of the blank-carrier, so that as the plate-carrier (composed of the arms 47) is caused to oscillate around said axes the pivots 40 will have a movement away from and toward the blank-supporting surface, or, in other words, that on account of its peculiar organization the said pivots of the blank-folding member will have a rise-and-fall movement relative to the blank-carrier. Since in the present instance the blank-carrier has a fixed axis and inasmuch as the blank-folding member is pivoted at a point remote from the defining edge, the location of the pivot-axis of the plate-carrier should be necessarily such as to permit the defining edge to avoid interference with the blank-carrier during its oscillation in said plate-carrier, and my invention includes as one of its features a blank-folding member having a defining edge which is guided in a predetermined path relative to the blank-carrier and in such a manner that a suitable distance between said edge and the blank-carrier will be maintained during the time when the blank is opened out into the diamond form.

From the above it will be understood that the blank-folding member is mounted for oscillation in a carrier which is advanceable with the blank-carrier, and means are provided whereby proper oscillatory movement may be imparted to said blank-folding member in its carrier, the means illustrated in the present instance comprising a pinion 56, mounted upon one of the trunnions 40 and engaged by an internal gear-segment 57. If now the latter were stationary, a forward swinging movement of the arms 47 would cause the blank-folding member to be advanced, but the edge 38 of said folding member would not move in a path with the proper ratio of speed relative to the peripheral advance of the blank-carrier 27. Hence it is evident that in order to modify the regular forward rotation of the plate 37 so as to conform to the travel of the blank-carrier means should

be provided whereby the plate shall be rotated in its carrier proportionately to the advance movement of the carrier 47. In other terms, the rotary movement of the plate 37 in the arms 47 must be modified during the comparatively regular movement of the said arms, and for this reason the internal gear-segment is also mounted for advancing rotating movement during the coaction of the folding member with the blank-carrier when opening out the blank and substantially in the following manner: The pinion 56 is in engagement with the internal segment 57, the hub of which is in its turn provided with gear-teeth 58, in engagement with a sector 59, which may be journaled on a stud 60, held in the side frame 11. The sector 59 carries an arm 61, having at its free end a cam-roller 62 in engagement with a cam-groove 63, formed in the side of the cam 64, secured to the shaft 22 of the machine. The cam 64 has also another cam-groove 65, engaging a roller 66, (see Fig. 3,) which is journaled on one of the arms 52 and whereby proper oscillatory movement may be imparted to the sector 50 above mentioned.

Referring now to the diagrammatic view, Fig. 10, the movement of the defining edge 38 relative to that of the blank-carrier and resulting from the organization of the mechanism above described is clearly shown, a number of succeeding positions having been chosen to illustrate the operation. In order to facilitate the understanding of the diagram, the several elements thereof have been designated by characters corresponding to the several machine elements as hereinbefore given, said characters being supplemented by letters "a," "b," "c," "d," "e," and "f," so that the lines and points belonging to each position may be readily distinguished. In this figure the starting positions of the several parts are indicated by the supplemental letter "a," and the blank-carrier is shown as being turned for a number of equal peripheral spaces—as, for instance, from 27^a to 27^b and then to 27^c, 27^d, and 27^e, while the position 27^f indicates that which the initial point 27^a will occupy near the end of the diamond-forming operation and when the blank-folding member 37 and the defining edge 38 will have arrived at the end of their forward movement. As the periphery of the blank-carrier travels from the point 27^a to the point 27^b the defining edge will move from 38^a to 38^b substantially in a straight line and in such a manner that the edge 38^b comes above the carrier-point 27^b, after which the edge 38 advances with the point 27 throughout the diamond-forming operation and until the position *f* has been reached. The pinion 56 is initially in engagement with the internal gear 57 at the point 57^a, and while the trunnion 40 of said pinion 56 travels from the position 40^a to the position 40^b the internal gear 57 will be moved in a small arc corresponding to the distance between the points 57^a and 57^b, so that, therefore, said pinion 56 will not have been turned to an amount which it would have been provided the segment 57 was stationary. For this reason the folding member 37^a will have been swung around the trunnion 40 for a small amount also, and by comparison of the several positions, as indicated by the supplemental letters "a" to "f," inclusive, the movement of the several elements and their operating mechanism may be clearly understood, said positions being furthermore differentiated from each other by differently-characterized lines, so that each group of elements belonging to one position may be recognized at a glance.

It will be observed that during the diamond-fold-forming operation, while the trunnions 40 travel from the position 40^a to the position 40^f, the folding mechanism or devices supported by the trunnions 40 are moved forwardly bodily through a curved path which is concave toward the blank-support by the arms 47, which are pivotally supported in turn on the concave side of the path of the trunnions. By this arrangement the period during which the diamond-fold-forming operation is carried out is materially prolonged over what it would be if the trunnions 40 were not given a movement with the blank-carrier during the said diamond-fold-forming operation, thereby affording more time for the required unfolding and refolding of the tucked sides of the blank. At the same time the velocity of movement of the axis of the trunnions 40 is such that the axis travels in a circular arc about an axis which is adjacent to and advances with the same angular speed as the folding bed, the last-mentioned axis being of course coincident with the primary transverse crease-line formed in the upper ply of the blank. In other words, the axis of the trunnions 40 during its forward movement and while describing an arc relative to the stationary parts of the machine about the shaft 48 as an axis travels also relative to the moving blank in a circular arc about the primary transverse crease-line of the upper ply of the blank.

An important feature of my invention is the provision of means by which the folding devices which are pivotally connected to the arms 47 to turn relatively thereto about an axis laterally displaced from the primary transverse crease-line formed in the upper ply of the blank are moved by the arms to carry the folding devices with the folding bed to prolong the period of the folding operation and also away from and toward the folding bed in such a manner that the desired clearance between the folding devices and each folding bed may be had without giving any rising-and-falling movement to the folding bed to accommodate it to the movement

of the folding devices, and each folding bed may therefore be moved so that its blank-engaging surface is carried through a path which is practically a continuation of itself.

From the foregoing description it will be seen that the blank-folding member 37 has an oscillatory movement in its carrier, while at the same time the carrier itself is oscillated around its pivot-axis until the position shown in Fig. 8 has been reached, when it becomes necessary again to open the box-holders 42 to release the blank and when the diamond is substantially completed. The box-holders are opened at this point by devices which are in the present instance carried by the arms 47 and which consist, substantially, of fingers 67, preferably formed integral with said arms and adapted to engage the tailpieces 43 of the box-holders, as shown in Fig. 8.

Interposed between the feed-rollers 13 14 and the carrier 27 is a guide-plate 68, whereby the blank as it is fed forward by the feed-rolls will be guided with its front end between the folding member and the carrier and which may also be secured to the shaft or bar 45 above mentioned.

Journaled in the side frames is a shaft 69, obtaining motion through a gear 69′ in engagement with the gear 21 and carrying a cam 70 in engagement with a roller 71, which is journaled on an arm 72, actuated by a spring 72′ and one end of which carries a drop-plate 74, adapted to coöperate with the blank-carrier for flattening the diamond after the tuck-holders and box-holders have stretched out the sides of the tucked tube. After the diamond has been flattened by the drop-plate the blank may be carried by the carrier into contact with a paster-roll 75, mounted on the shaft 69, and whereby the blank may be supplied with paste, and then subjected to the action of a delivery-roll 76, which may be mounted on the shaft 24 above mentioned. This delivery-roll serves to held the blank on the carrier after the holders have been released therefrom, and the blank may then be deflected by a plate, such as 77, toward folding devices (not shown) whereby the blank may be transformed into the completed bag.

The operation of my improved machine is as follows: Bellows-sided or tucked tubing is introduced into the machine by the feed-rolls 13 14 and guided by the plate 68 into position between the blank-folding member 37 and the carrier 27 in such a manner that the tuck-holders 28 and the front diamond-holder 32 will engage the lower ply of the blank, as shown in Fig. 5. While the blank is delivered to the tuck-holders the box-holders 42 of the blank-folding member 37 are open and the movement of the blank-folding member is so timed relatively to the movement of the blank-carrier that the front edges of the tuck-holders and box-holders will move in alinement with each other, whereupon both blank-carrier and the defining edge of the blank-folding member will travel in unison during the formation of the diamond. The path which the defining edge traverses during the working stroke thereof is such that the distance between said edge and the blank-carrier will be substantially maintained during the greater portion of their combined forward travel, said blank-folding member being caused to oscillate in its carrier, while the latter is oscillated to advance the pivot-support of the folding member in a certain predetermined ratio relative to and with the blank-carrier. In this manner the blank-folding member is practically turned over and about said defining edge as an axis, thus gradually separating the box-holders from the tuck-holders, which action will result in opening out the tucked sides and form the inside triangular folds, as shown in Figs. 6 and 7, which illustrate the tucked tube opened out into a so-called "box form." In Fig. 8 the blank-folding member is shown as having arrived at the end of its stroke and illustrating the drop-plate in its lowered position, substantially completing the diamond, the face view of which is illustrated in Fig. 9. At this time the fingers 67 have been thrown sufficiently inward to release the box-holders from the blank, and the latter is drawn forward from under the drop-plate 74 and into contact with a roll 75, whereby paste may be supplied to the blank, and at the same time the folds of the sides may be more sharply creased preparatory to subjecting the blank to flap-folding devices. (Not shown.)

It is obvious that the construction of the machine as shown and described may be varied in many ways without departing from the spirit of my invention, and while I have shown a rotary blank-carrier in connection with a blank-folding member organized according to my improvement it is evident that other forms of carriers may be substituted therefor.

In my copending applications, Serial No. 27,864, filed August 23, 1900; Serial No. 32,123, filed October 5, 1900, and Serial No. 35,086, filed November 1, 1900, I have shown, described, and claimed certain novel features shown and described but not claimed herein. In so far as this application discloses matter described and claimed in said prior applications it is to be regarded as subordinate to them.

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

1. In a bag-machine, mechanism for forming diamond folds on a bellows-sided bag-blank, including in combination a folding-bed, means for moving said bed to carry its

blank-engaging surface through a path which is practically a continuation of said surface, means for holding a bag-blank against said surface, a carrier, folding devices pivotally supported by the carrier to turn relatively thereto about an axis, means for moving said carrier during the folding operation to carry said axis through a path concave toward the folding-bed and with such a velocity relative to that of the bed, that said axis travels in a substantially circular path about a second axis which is adjacent the blank-engaging surface of the folding-bed and has substantially the same movement of advance as the folding-bed, and means for turning the folding devices relatively to the carrier about the first-mentioned axis as the latter moves through said concave path.

2. In a bag-machine, mechanism for forming diamond folds on a bellows-sided bag-blank, including in combination a folding-bed, means for moving said bed to carry its blank-engaging surface through a path which is practically a continuation of said surface means for holding a bag-blank against said surface, a carrier, folding devices pivotally supported by the carrier to turn relatively thereto about an axis, means for moving said folding devices during the folding operation to carry said axis through a path concave toward the folding-bed, said means comprising a pivotal support for the carrier located on the concave side of the path of said axis and means for oscillating said carrier about said pivotal support, and means for oscillating said folding devices on said carrier about said axis.

3. In a bag-machine, mechanism for forming diamond folds on a bellows-sided blank including in combination a rotary blank-support, means for holding the lower ply of the blank to the support, carriers, means for oscillating the carriers about a center adjacent to the rotary path of the blank-support, folding devices moved by said carriers with the support during the triangular-fold-forming operation through a curved path concave toward the rotary path of the bed, and means for operating said folding devices on their carriers to engage and open the blank.

4. In a bag-machine, mechanism for forming diamond folds on a bellows-sided blank including in combination a blank-support rotating about a fixed axis, means for holding the lower ply of the blank to the support, carrier-arms, means for oscillating them about a fixed axis remote from the axis of the blank-support, folding devices carried by said carriers during the diamond-folding operation with the support through a curved path concave toward the rotary path of the bed including a folding member mounted for oscillation upon the carrier-arms and having a defining edge at a distance from its axis less than the greatest distance to which the axis moves away from the rotary path of the bed whereby said defining edge may be carried clear of the blank-support as it swings back and forth over that support.

5. In a bag-machine, mechanism for forming diamond folds on bellows-sided blanks, including in combination a blank-support rotating about a fixed axis, carrier-arms, a blank-folding member having a defining edge and pivotally supported upon said carrier-arms to turn relatively to said arms about an axis remote from said defining edge, means for moving said carrier-arms to carry said blank-folding member during the diamond-forming operation, with the support through a curved path concave toward the blank-support, means for holding the lower ply of the blank to the support, a box-holder cooperating with the folding member, and means including toothed gearing for oscillating the blank-folding member upon its axis of movement relative to said arms.

6. The combination with a rotary blank-carrier having tuck-holders, of a carrier pivotally supported to turn about an axis adjacent the blank-supporting surface of the blank-carrier, a blank-folding member having a defining edge and box-holders pivotally supported by said carrier to turn relatively thereto about an axis remote from said edge, means for oscillating said carrier about its axis to move the blank-folding member with the support through a curved path concave toward the blank-carrier during the diamond-forming operation, and means for oscillating the blank-folding member about its axis of movement relative to the carrier during said operation.

7. In a bag-machine, mechanism for forming diamond folds on a bellows-sided bag-blank, including in combination a blank support rotating about an axis, means for holding the lower ply of a bag-blank thereto, a carrier-arm mounted for oscillation about a fixed axis laterally displaced from the axis of the blank-support, folding devices pivotally supported by said arm, means including a toothed gear secured to said arms concentrically with its axis for swinging said carrier to move the folding devices with the support through a curved path concave toward the blank-support, and means including toothed gearing for oscillating said folding devices relative to said carrier.

8. In a bag-machine, mechanism for forming diamond folds on a bellows-sided bag-blank including in combination a blank-support rotating about a fixed axis, means for holding the lower ply of a bag-blank thereto, carrier-arms pivotally supported to turn about an axis remote from the axis of the blank-support, folding devices pivotally supported on said arms, means for oscillating said arms to carry said folding devices during the diamond-forming operation with the

support through a curved path concave toward the blank-support, and means for oscillating said folding devices relatively to said arms during said operation, including a gear-appurtenant to the blank-folding devices and concentric with their axis of oscillation relative to the arms, and coöperating gearing pivotally supported to turn about an axis in alinement with the axis of oscillation of the carrier-arms.

9. In a bag-machine, mechanism for forming diamond folds on a bellows-sided blank, including in combination a blank-support rotating about a fixed axis, means for holding the lower ply of a blank thereto, carrier-arms pivotally supported to turn about an axis remote from the axis of the blank-support, folding devices pivotally supported upon said arms and including means for engaging the upper ply of the blank, means including a gear appurtenant to the said carrier-arms for swinging them about their axis to carry the folding devices during the diamond-forming operation with the support through a curved path concave toward the blank-support, a gear appurtenant to the folding devices and concentric to the axis of oscillation thereof, and coöperating gearing journaled concentrically with the axis of oscillation of said arms for oscillating the folding devices relatively to the arms as the latter are moved forward and back.

10. In a bag-machine, mechanism for forming diamond folds on a bellows-sided blank including in combination a blank-support pivotally supported to rotate about a fixed axis, means for holding the lower ply of the blank to the blank-support, a carrier-arm mounted for oscillation about an axis remote from the axis of the blank-support, folding devices pivotally supported upon the said arm to turn about an axis situated outside of the rotary path of the blank-support, means including a cam for swinging said arm forward and back to carry the folding devices, during the diamond-forming operation, with the support through a curved path concave toward the blank-support and means for operating the folding devices on the arm as the latter is oscillated, comprising a member pivoted to turn about an axis in alinement with the axis of oscillation of said arm.

11. In a bag-machine, the combination with the blank-support, of means for holding the lower ply of the blank to the support, blank-folding mechanism, comprising a folding-plate and box-holders, a swinging carrier pivotally supporting said plate, means for pivotally supporting said carrier, means for swinging said carrier relatively to its support to move the folding-plate during the diamond-forming operation with the support through a curved path concave toward the blank-support, including a gear concentric with the pivotal support of the carrier, and means for oscillating the plate relatively to the carrier, including a gear secured to the plate, and a connecting driving-gear therefor situated concentric with the pivotal support of the carrier.

12. In a bag-machine, mechanism for forming diamond folds on a bellows-sided blank, including in combination a blank-support pivotally supported to turn about a fixed axis, means for holding the lower ply of the blank to the support, a carrier-arm, means pivotally supporting said arm for oscillation about an axis laterally displaced from the axis of the blank-support, a folding device pivotally supported on said carrier-arm, means for swinging said arm about its pivotal support to carry said folding device with the support through a curved path concave toward the blank-support, and means for oscillating said folding device relative to said carrier-arm during the movement in said path, including a gear secured to the device and a gear concentric with the pivotal support of said carrier.

13. In a bag-machine, mechanism for forming diamond folds on a bellows-sided blank, including in combination a rotary blank-support, means for holding the lower ply of the blank thereto, a carrier-arm, means pivotally supporting said arm, a box-holder pivotally supported by said arm, means for oscillating said arm including a toothed gear mounted concentrically with the pivotal support for said arm, and means for oscillating said box-holder relative to said arm including a toothed gear journaled concentrically with the pivotal support of said arm.

14. In a paper-bag machine, mechanism for forming diamond folds on a bellows-sided blank, including in combination a rotating folding-bed, means for securing the lower ply of the blank to the bed, an arm extending over the folding-bed, means pivotally supporting said arm, devices mounted on said arm for engaging the upper ply of the blank, said devices including a shaft journaled in said arm at one side of the axis of oscillation of the arm relatively to its pivotal support, means for oscillating said arm relative to its support, including a gear concentric with the axis of said pivotal support, and means for oscillating said shaft, including a gear also mounted concentrically with the axis of oscillation of said arm.

15. A rotary blank-support constituting a folding-bed, means for holding the lower plies of successive blanks on the blank-support, a folding-plate provided with means including box-holders for folding back the upper plies of the successive blanks, an arm pivotally supporting the said plate and mounted for oscillation upon an axis located in eccentric relation to the circle of rotation of the blank-support, means including a sector for oscillating the folding-plate upon its pivot-axis, and means for oscillating the arm to move the

said axis of the folding-plate forward relative to the direction of movement of the blank-support.

16. A rotating blank-support constituting a folding-bed, means for holding the lower plies of successive blanks upon the support, a blank-folding plate, provided with means including box-holders for folding back the upper plies of the successive blanks carried by the support, a plate-carrier mounted for swinging movement on an axis located eccentric to the circle of rotation of the blank-carrier, means for swinging the plate-carrier on its axis, and means including a sector-gear for swinging the folding-plate upon the plate-carrier.

17. In a bag-machine, mechanism for forming diamond folds on a bellows-sided blank, including in combination a folding-bed rotating in a circular path about a fixed axis, means for holding a bag-blank against said bed, a carrier, folding devices pivotally supported by said carrier to turn relatively thereto about an axis, said devices including a folding-plate having a defining edge remote from the axis of the folding devices, means for moving the last-mentioned axis during the folding operation through such a predetermined path concave toward the path of the folding-bed that the maximum separation between said paths is not less than the distance between the axis and defining edge of the folding-plate, said means comprising a pivotal support for the carrier located between the axis of movement of the bed and said predetermined axis-path and means for turning the carrier during the folding operation about its pivotal support in the same direction as the folding-bed turns about its axis, and means for oscillating the folding devices relative to said carrier as the latter turns on its pivotal support.

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Witnesses:
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