No. 847,957. PATENTED MAR. 19, 1907.

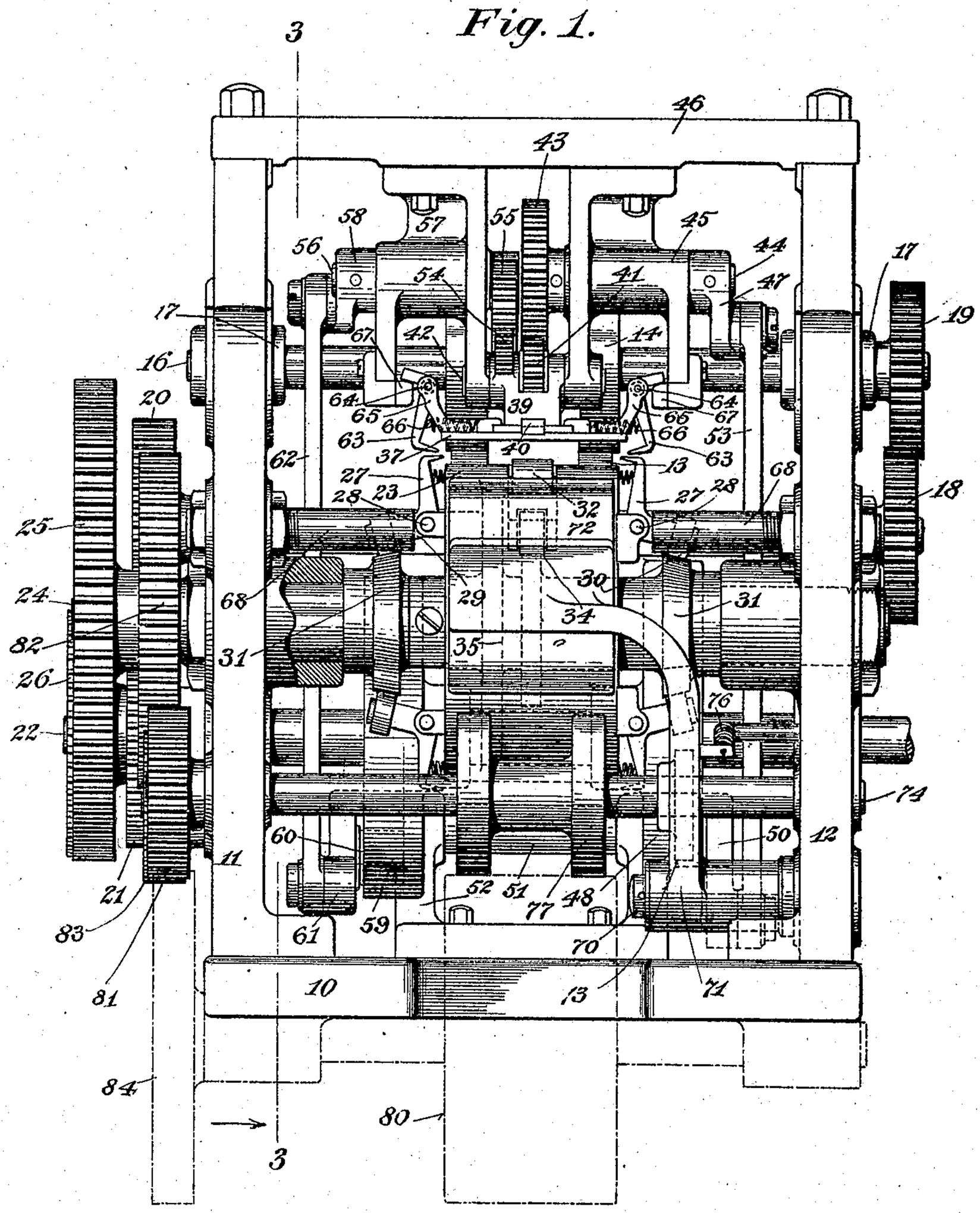
W. A. LORENZ.

PAPER BAG MACHINE.

APPLICATION FILED SEPT. 29, 1900.

5 SHEETS—SHEET 1.

Fig. 1.



Witnesses:

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6 SHEETS—SHEET 2.

Fig. 2.

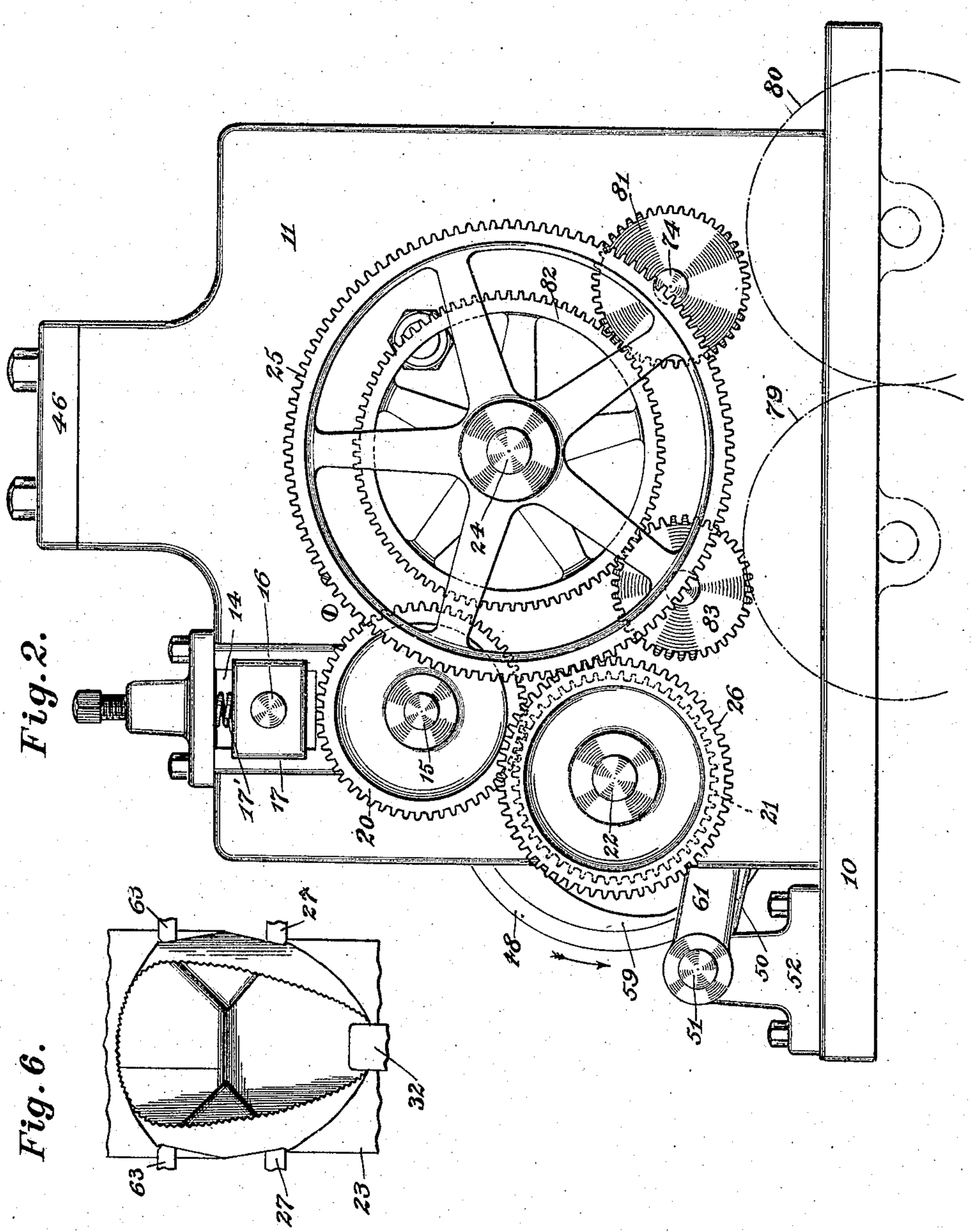

Fig. 6.

Witnesses

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6 SHEETS—SHEET 3.

Fig. 3.

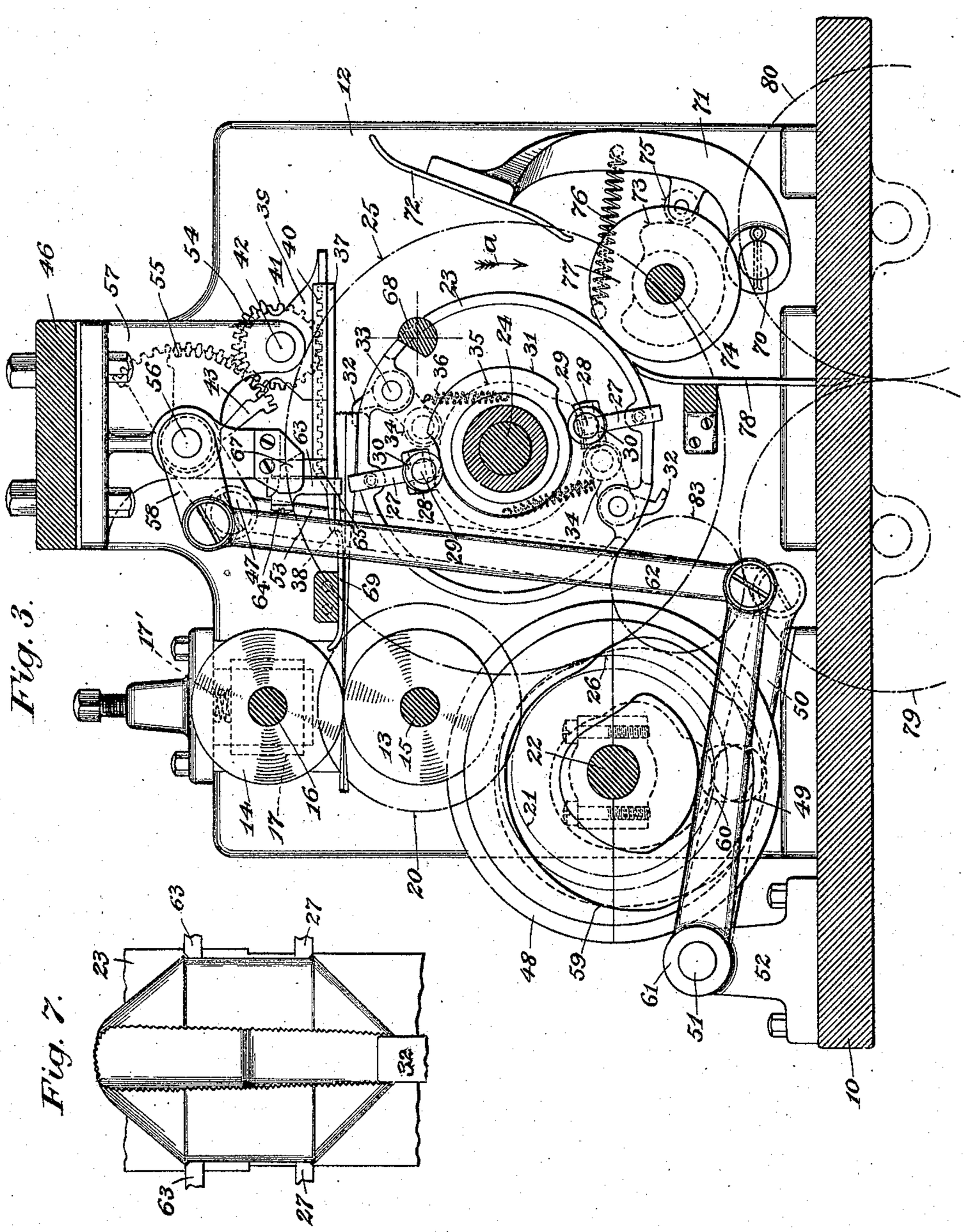

Fig. 7.

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5 SHEETS—SHEET 4.

Fig. 5.

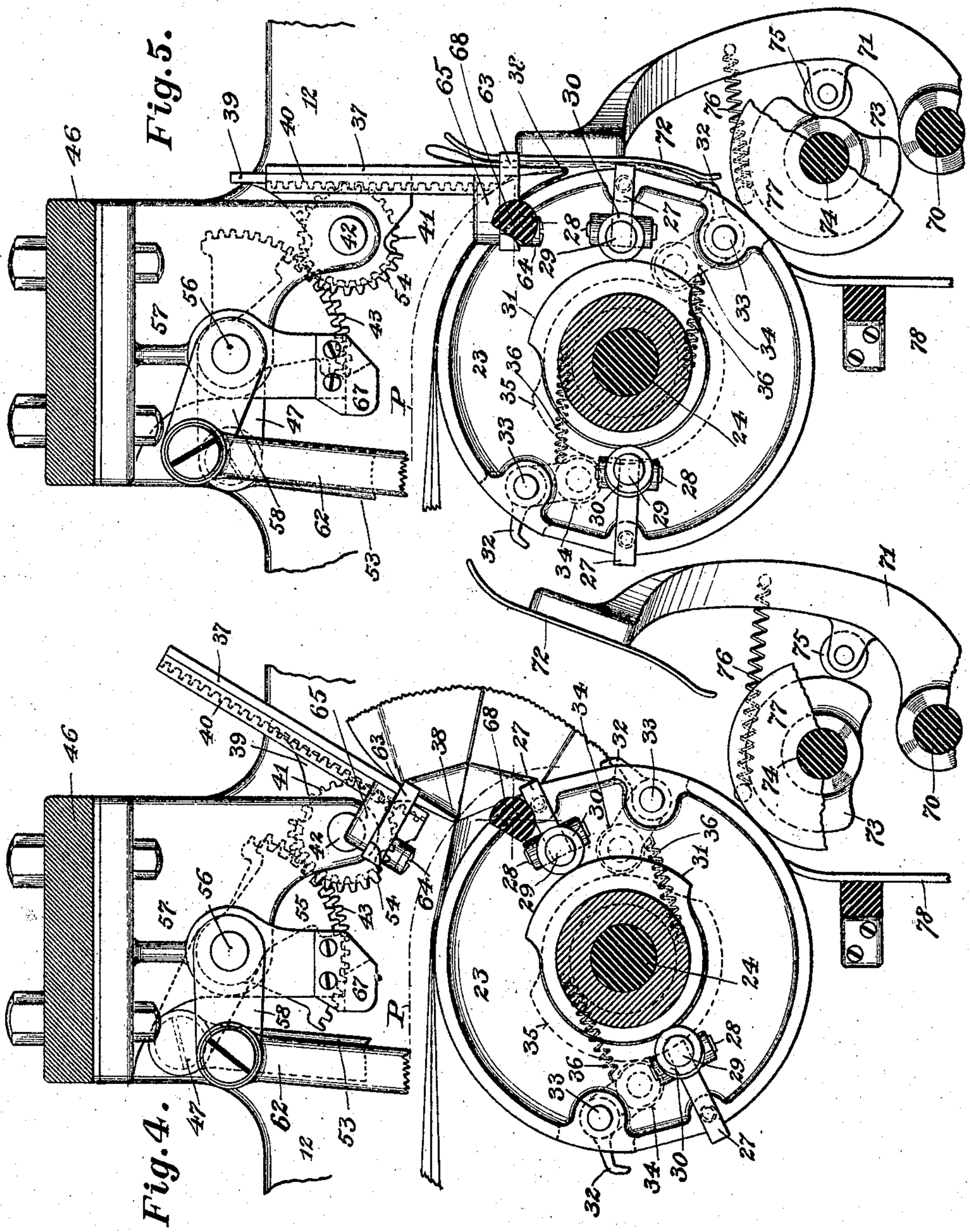

Fig. 4.

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5 SHEETS—SHEET 5.

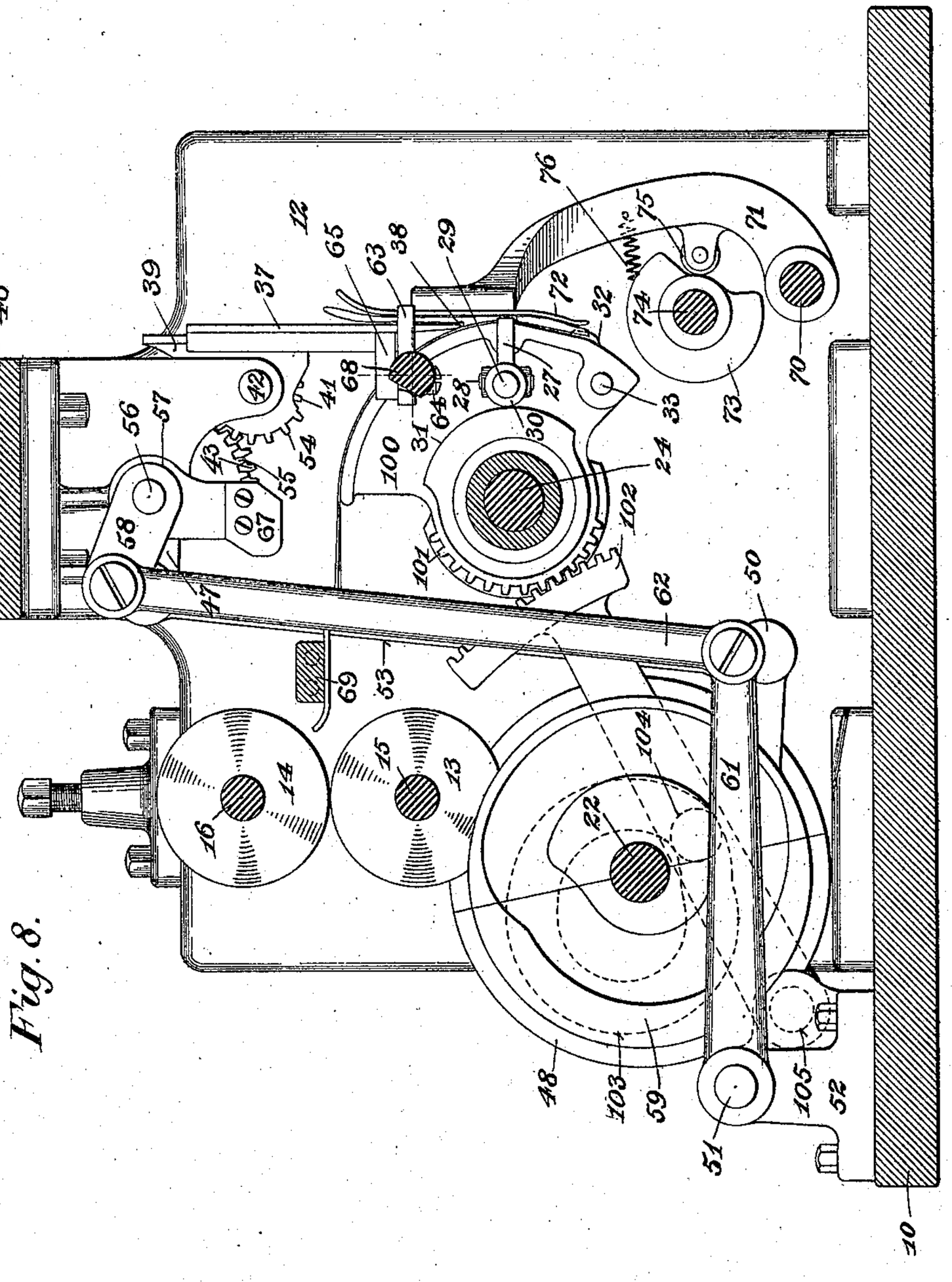

Fig. 8.

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UNITED STATES PATENT OFFICE.

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PAPER-BAG MACHINE.

No. 847,957. Specification of Letters Patent. Patented March 19, 1907.

Application filed September 29, 1900. Serial No. 31,487.

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 particularly to that class thereof which are employed for manufacturing square-bottomed paper bags from tucked or bellows-sided tubing.

The invention comprises what is technically known as the "diamond-folding" section of a paper-bag machine, which receives the bellows-sided blanks from any suitable blank-folding mechanism, makes the well-known diamond folds therein, and passes the diamond-folded blank on to any suitable flap-folding mechanism for completing the bag.

The general object of the present invention is to provide an improved construction, arrangement, and mode of operation of the blank-folding mechanism, whereby the unfolding of the bellows-sided tucks and their refolding into the inner triangular folds and the diamond-folding, which are characteristic of this type of bag, are accomplished in a more natural, certain, rapid, and accurate manner than heretofore.

In this invention the paper-bag blanks are carried forward by a rotary or oscillatory blank-support, which provides a folding-bed for supporting the blank during the folding operation. The devices which engage the upper ply of the blank to fold it back during its conversion into a diamond-folded blank are mounted both for sliding and oscillatory movement, whereby the instrumentalities which engage with that upper ply may be advanced in the direction of the travel of the blank during a considerable portion of that travel and may also follow either closely or approximately, as may be desired, the curvature of the path in which the blank is carried. These sliding and oscillatory movements of the said devices are both controlled from and operated through a fixed axis by means of gears or equivalent devices, thus making a simple, compact, easily-observed, and readily-controlled mechanism.

In the drawings accompanying this invention, and in which similar characters denote similar parts, Figure 1 is a front view of my improved machine. Fig. 2 is a side view of the same looking from the left of Fig. 1. Fig. 3 is a vertical section on line 3 3, Fig. 1. Fig. 4 illustrates the blank-folding member and the carrier on an enlarged scale and in a position where the end of the tube is partly opened to assume the box form. Fig. 5 is a view similar to Fig. 4, showing the blank-folding carrier in position after the diamond has been completed and flattened. Fig. 6 represents an end view of the partly-opened-out end of the tube, corresponding with Fig. 4. Fig. 7 is a face view of the diamond, corresponding to the form obtained in Fig. 5; and Fig. 8 shows a modification of the machine, the carrier here shown being of the oscillatory type.

In the drawings, 10 designates the bed-plate, having secured thereto a pair of upright side frames 11 12, in which the several coöperating shafts for driving the various devices are supported. Suitable means are provided for feeding individual blanks or bellows-sided tubing into the machine, these means consisting in the present instance of feed-rollers 13 and 14, mounted on shafts 15 and 16, respectively, the latter being journaled in boxes 17, movably held in the side frames and acted upon by springs 17′. The feed-rollers may be caused to move peripherally in unison by means of gears 18 and 19, mounted on said shafts and driven by a gear 20, mounted on the lower roll-shaft 15 and obtaining motion from a similar gear 21, mounted upon a shaft 22, which constitutes the main driving-shaft of the machine and to which power may be applied from any ordinary source. From the feed-rollers the blank is conducted to a suitable carrier, serving as a support for the blank during the diamond-forming operation. Connected for coöperation with the carrier is a blank-folding member adapted for engaging the upper ply of the tube or blank, while the carrier is provided with means whereby the lower ply of the blank is securely held in place thereon, both carrier and blank-folding member coacting to open out the end of the blank and to form the diamond, as will hereinafter appear. In the preferred form thereof shown

the carrier is of the rotary type and consists, substantially, of a cylinder, such as 23, mounted upon a shaft 24, which receives rotary movement through a gear 25, secured thereto and in engagement with a gear 26, mounted upon the main driving-shaft 22, above mentioned. The means for holding the lower ply of the tube on the carrier consists, preferably, of a pair of tuck-holders 27, journaled at 28 on the carrier and having roll-receiving portions 29, on which cam-rollers 30 are journaled. These cam-rollers are adapted to travel around the periphery of suitable cams 31, which are preferably stationary and which cause the tuck-holders to grip the lower ply of the blank on both sides simultaneously and at the proper time. The carrier 23 is also provided with a device for gripping or holding the front end of the lower ply of the tube or blank, this device being shown herein as a front diamond-holder 32, journaled at 33 in the web of the carrier and carrying a roll 34, in engagement with a suitable stationary cam 35, whereby as the carrier rotates said holder 32 will be caused to release the blank at a certain time, while a spring 36 may be employed for closing said holder over the lower ply of the blank, as shown in Fig. 3.

The blank-folding member, which, as above stated, is connected for coöperation with the carrier, is herein illustrated as a reciprocative plate adapted for oscillation around a fixed axis and one edge of which serves as the bottom-defining edge for the blank. Means are provided for actuating the blank-folding member, or, as it is generally called, the "defining-plate," in such a manner as to cause the defining edge to maintain a substantial distance from the surface of the carrier during the diamond-forming operation. This result is accomplished in the present instance by reciprocating the defining-plate in a guide, which in turn is mounted for oscillation around an axis, both movements—reciprocation and oscillation—being so timed for coaction with each other as to cause the defining edge to travel in a path indicated by dot-and-dash line P. (See Figs. 4 and 5.) I have shown a folding member and a carrier both of which are movable, so that the defining edge will be caused to travel in unison with the carrier and at a substantial distance from the surface thereof during the formation of the diamond, and particularly during the defining of the inner triangular folds thereof. The blank-folding member or defining-plate consists, substantially, of a plate 37, having a defining edge 38 and adapted for reciprocation within a guide 39, the plate being provided with rack-teeth 40, in engagement with a pinion 41, which is loosely mounted upon a spindle 42. Proper oscillatory movement may be imparted to the pinion 41 by a sector 43, secured to a spindle 44, which is journaled in a bracket 45, held on a cross-bar 46, whereby the side frames 11 and 12 are tied at their tops. The spindle 44 also carries at its outer end a crank-arm 47, to which a proper oscillatory movement may be imparted by a cam 48, mounted upon the main shaft 22 and having a groove in engagement with a roller 49, which is journaled on a lever 50. The rear end of said lever 50 is fulcrumed at 51 on a bracket 52, while its forward end is connected by a link 53 with the above-mentioned crank-arm 47. While the plate 37 may be reciprocated in the guide 39 by the means just described, oscillatory movement may be imparted to said guide around an axis in alinement with the spindle 42, the guide 39 being provided with gear-teeth 54, in engagement with a sector 55, mounted upon a spindle 56, which is journaled in a bracket 57 and carries at its outer end a crank-arm 58. This arm 58, and consequently the spindle 56, may be oscillated by a suitable cam 59, the groove of which is in engagement with a roller 60, journaled on a lever 61, having its fulcrum on the spindle 51 and the free end of which is connected with the crank-arm 58 by a link 62. From the foregoing description it will be clearly understood that the position of the defining edge may be absolutely and positively controlled according to the shapes of the operating-cams 48 and 59, each of which is in the present instance made in halves, so as to be readily removable from the main shaft to permit the substitution of other cams therefor.

The folding-plate 37 carries near the defining edge a pair of box-holders 63, which are pivoted at 64 to bracket 65, secured to or forming a part of the plate 37. These box-holders 63 are actuated to close against and hold the upper ply of the tucked tube or blank—as, for instance, by springs 66—while abutments 67, secured to the brackets 45 and 57, respectively, may serve to open said box-holders against the action of said springs 66 when the defining-plate is in its blank-receiving position. (Shown in Fig. 3.) When the plate 37 arrives at its blank-discharging position, the box-holders may be again opened by abutments 68, secured to the side frames 11 and 12.

After passing the feed-rolls 13 and 14 the blank is properly guided by a guide-plate 69 between the blank-folding member and the carrier and into position to be gripped by the tuck-holders 27 and the box-holders 63.

Secured to the side frame 12 is a stud 70, on which is journaled a lever 71, carrying at one end a drop-plate 72, adapted to coöperate with the carrier in flattening and completing the diamond after the tuck-holders and box-holders have stretched out the sides of the tucked tube. The lever 71 may be actuated by a cam 73, secured to a shaft 74

and engaging a cam-roller 75, journaled on the arm 71, while a spring 76 may be employed to force the drop-plate 72 against the carrier. After the diamond has been flattened by the drop-plate the blank may be carried into contact with a presser-roll 77, mounted upon the shaft 74, after which a delivery-plate 78 may deflect the blank from the carrier and conduct the same to other devices, which may include a paster-roll and flap-folding devices 79 and 80, whereby the blank is transformed into the completed bag. The presser-roll shaft 74, which also carries the cam 73 for actuating the drop-plate, obtains rotary movement through a gear 81, engaged by a gear 82, which is secured upon the carrier-shaft 24 and which through an intermediate 83 also drives the flap-folding devices, said intermediate being in engagement with a gear 84. (Shown in dot-and-dash line in Fig. 1.)

In Fig. 8 I have shown a modification of my improved machine, which in this instance inc,udes an oscillatory carrier instead of a rotary device, as described. Here the carrier 100 is provided with gear-teeth 101, in engagement with a sector 102, to which proper movement may be imparted by a cam 103, engaging the cam-roller 104, journaled on the arm of the sector 102, the latter being pivoted at 105 to the bracket 52.

The operation of my improved machine is as follows: Bellows-sided or tucked tubing is introduced into the machine by the feed-rolls 13 and 14 and guided by the plate 69 between the blank-folding member 37 and the carrier 23 in such a manner that the tuck-holders 27 and the front diamond, holder 32 will engage the lower ply of the blank, as seen in Fig. 3, and it will thus be carried along by the carrier in the direction of arrow *a*. While the blank is delivered to the tuck-holders the box-holders 63 of the blank-folding member 37 are open, and the movement of the blank-folding member with the box-holders is so timed relatively to the carrier that the front edges of the tuck-holders and of the box-holders will be in alinement when they grip the blank, after which both the 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 in its course is, as has been stated, subject to variation by the substitution of the required cams in lieu of the cams 48 and 59 shown in the drawings. In Figs. 4 and 6 the end of the tucked tube is shown opened out into what is generally known as the "box form," clearly illustrating the manner of forming the inside triangular folds, and in Figs. 5 and 8 the blank-folding member is shown as having arrived at the end of its stroke and showing the drop-plate in its operative position substantially completing the diamond. At this time the box-holders are disengaged from the blank and the latter is drawn forward under the drop-plate 72, which can now move more closely toward the carrier and the defining-plate and will therefore flatten the diamond more fully. Just as soon as the drop-plate compresses the blank against the defining-plate after the latter has arrived in the position shown in Fig. 5, in which, as has previously been mentioned, the box-holders are open, the defining-plate may start on its return stroke and withdraw from under the folding-plate. It will be evident from the description given above that when the defining-plate starts on its return stroke the box-holders will close after the rear flap of the diamond has been withdrawn sufficiently to clear them. Hence the blank-folding member may start on its return stroke immediately after the drop-plate has arrived in its operating position, and thus obviate all loss of time. As the blank is withdrawn from under the drop-plate 72 it is passed under the roll 77 by the front diamond-holder and the tuck-holders, which will after they pass the roll release the blank. The latter is then delivered to the flap-folding devices carried by rollers, (indicated by dot-and-dash lines 79 and 80.)

It is evident that many changes may be made in the particular construction of some of the elements of my improved machine without departing from the gist of my invention, and while I have shown and described the blank-folding member in coöperative connection with a rotary blank-carrier it should be understood that any other form of carrier may be successfully employed in connection with the blank-folding member and its operating mechanism whereby a substantial separation of the tucked sides of the tube adjacent to the defining edge is maintained during the formation of the inner triangular fold of the diamond.

In my copending application, Serial No. 32,123, filed October 5, 1900, I have shown, described, and claimed mechanism broadly similar to that shown in this application, in that it embodies the combination, in a movable blank-support, of an oscillatory blank-folding member having a defining edge, means for pivotally supporting said member on an axis remote from said edge, means for causing the advance movement of the entire blank-folding member, and means independent of and extraneous to the blank-support for oscillating the said member in its support. My present application so far as it shows and relates to such devices does so for the purpose of claiming specific novel constructions and combinations thereof and is a subordinate application to that above mentioned in respect of the said devices.

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

1. The combination with a blank-support, of a supporting-guide mounted on a fixed axis adjacent to the blank-support, a blank-folding member mounted for sliding movement in the said guide, means independent of the blank-support for swinging the guide and sliding the blank-folding member in the guide in coactive relation to the blank-support, and means coacting with the blank-folding member to cause the upper ply of the blank to turn therewith.

2. The combination with a blank-support, of a supporting-guide mounted to swing on a fixed axis adjacent to the blank-support, a blank-folding member having a defining edge and mounted for sliding movement in the said guide, means independent of the blank-support for swinging the guide and sliding the blank-folding member in the guide to carry the said defining edge in coactive relation to the blank-support, and means, coacting with the blank-folding member, to cause the upper ply of the blank to turn therewith.

3. The combination with a blank-support, of a blank-folding member, provided with means for turning back the upper ply of a blank carried by the support, a guide mounted to swing on a fixed axis and supporting the said folding member for sliding movement, and means including toothed gearing concentric with the said axis for swinging the guide and for sliding the folding member in the guide.

4. The combination with a rotary blank-carrier, having tuck-holders coöperative therewith, of a slidable reciprocatory blank-folding member, box-holders coöperative therewith, means independent of the blank-support for oscillating the blank-folding member during its operating movement, and means for opening and closing the box-holders to grip and release the blank.

5. The combination with a rotary blank-support having tuck-holders coöperative therewith, of a blank-folding member mounted for sliding and oscillatory movements relative to a fixed axis and including box-holders, means including toothed gearing mounted eccentric with the said axis for effecting the said sliding and oscillatory movements, and means for opening and closing the box-holders to grip and release the blank.

6. The combination with a traveling blank-support, of a blank-folding member provided with means for turning back the upper ply of the blank, a guide mounted for swinging movement and supporting the said folding member for sliding movement, means for swinging the guide, and means including toothed gearing for sliding the folding member in the guide.

7. The combination of a traveling blank-support, of a blank-folding member provided with means for turning back the upper ply of a blank carried on the said support, a guide mounted for turning movement and supporting the said folding member for sliding movement, means for swinging the guide, and means including a gear mounted in substantially concentric relation with the axis of the swinging guide for sliding the folding member in coactive relation to the blank-support.

8. The combination with a traveling blank-support, of a blank-folding member having means, including a defining edge, for turning back the upper ply of a blank carried by the said support, a guide mounted for oscillation and supporting the folding member for sliding movement, means for oscillating the guide, gear-teeth appurtenant to the folding member, a driving-gear meshing with said teeth and mounted to turn in concentric relation to the axis of oscillation of the guide, and means for moving the said gearing to carry the said folding member in coactive relation with the blank-support.

9. The combination with a traveling blank-support, of a blank-folding plate, having means, including a defining edge, for turning back the upper ply of a blank carried by the said support, a guide mounted for oscillation and supporting the said folding-plate for sliding movement, toothed gearing for swinging the said guide including a gear mounted in concentric relation to the said guide, and means for sliding the folding member in the guide, including gear-teeth appurtenant to the said plate, and including a gear mounted in concentric relation with the first-named gear and with the axis of oscillation of the guide.

10. The combination with a rotary blank-support, of a blank-folding member provided with means, including a defining edge, for turning back the upper ply of a blank carried by the said support, a guide mounted for swinging movement adjacent to the said support, and supporting the said folding member for sliding movement, and means for swinging the guide and sliding the plate therein to carry the said defining edge in coactive relation to the blank-support and at a substantial distance therefrom during the folding movement.

11. The combination with a rotary blank-support, of a folding member, provided with means including a defining edge for turning back the upper ply of a blank carried by the said support, a guide mounted for swinging movement, and supporting the said folding member for sliding movement, means including toothed gearing for sliding the folding member in the said guide, and means including toothed gearing for swinging the said guide in coöperation with the said sliding movement to carry the said defining edge forward in coactive relation to the blank-

support and at a substantial distance therefrom during the folding operation.

12. The combination with a rotary blank-support having tuck-holders, of a folding-plate having a defining edge and box-holders, a guide mounted for swinging movement and supporting the said folding member for sliding movement, gear-teeth appurtenant to the said folding member and to the said guide, and toothed gearing, including gears mounted in concentric relation to the axis of rotation of the guide for swinging the guide and for sliding the folding member in the guide.

13. The combination with a rotary blank-support, of means for turning back the upper ply of a blank carried by the support to form diamond folds therein, including a folding member having a defining edge mounted for sliding and oscillatory movements, means including toothed gearing for effecting the said oscillatory and sliding movements and cooperating to advance the said folding member in the direction of travel of the blank.

14. The combination with a rotary blank-support, of means for turning back the upper ply of a blank carried by the support, including a folding member having a defining edge and mounted for swinging and sliding movements, operating means including toothed gearing for swinging said folding member, operating means including toothed gearing for sliding said member, the two said operating means coacting to advance the said folding member in the general direction of travel of the blank, and to carry the defining edge of said member in a path which diverges from the path of travel of the blank during the operation of turning back the said ply.

15. The combination with a rotary blank-support, of means for turning back the upper ply of a blank carried by the support, including a folding member having a defining edge and mounted for sliding and oscillatory movements, operating means including toothed gearing for effecting the said oscillatory movement, and operating means including a rack and pinion for effecting the said sliding movement, the two said operating means coacting to advance the said folding member in the general direction of travel of the blank during the folding-back operation.

16. The combination with a rotary blank-support, of means for turning back the upper ply of a blank carried by the support, including a folding member having a defining edge, a swinging guide in which the said folding member is mounted for sliding movement, operating means including toothed gearing for swinging the said guide, and operating means including a rack and pinion for sliding the said folding member in the guide, the two said operating means coacting to advance the blank-folding member in the general direction of travel of the blank and to carry the defining edge of the said folding member in a variant path relative to the rotary path of the blank-support.

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