No. 847,191. PATENTED MAR. 12, 1907.

W. A. LORENZ.

PAPER BAG MACHINE.

APPLICATION FILED OCT. 5, 1900.

6 SHEETS—SHEET 1.

Fig. 1.

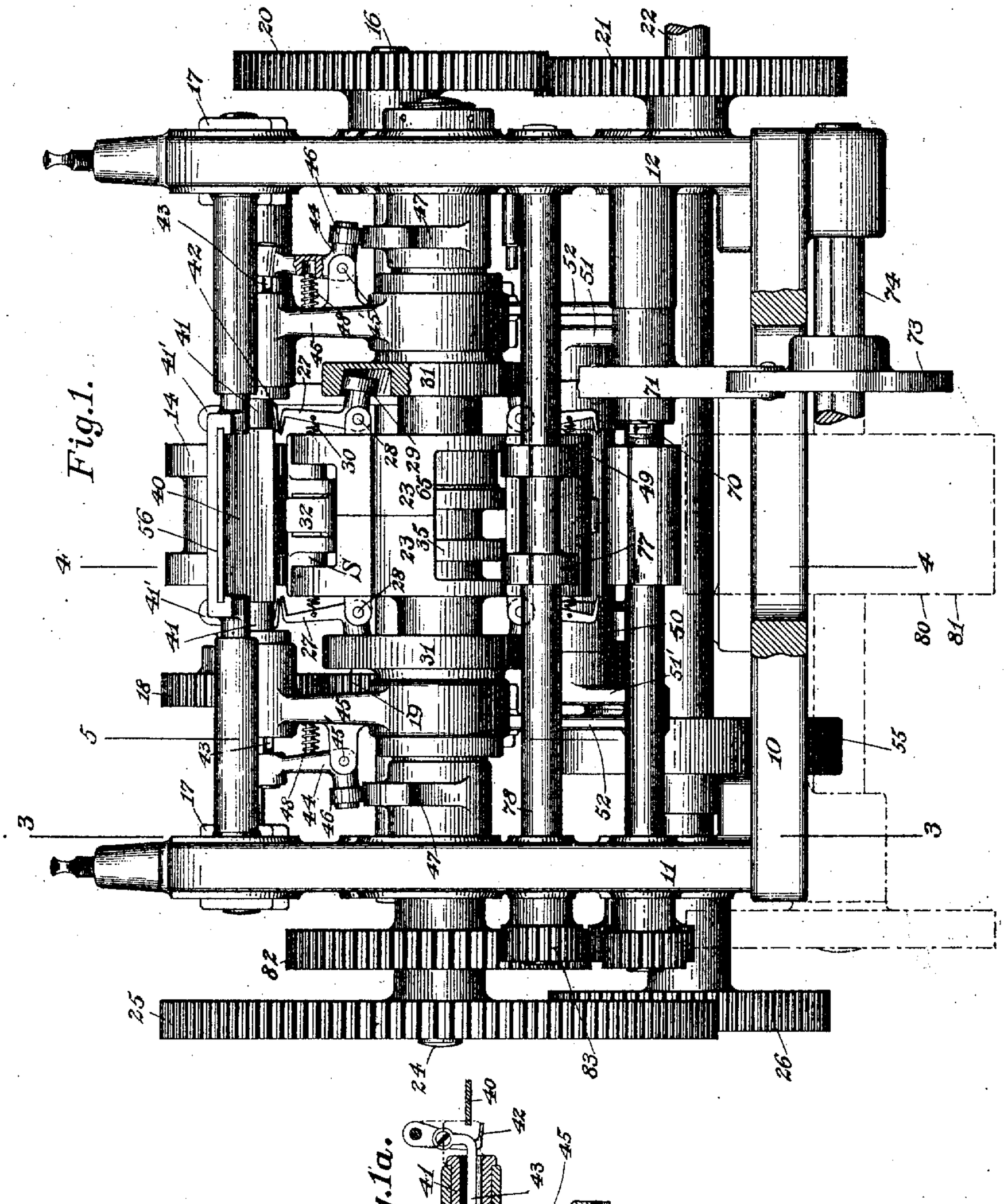
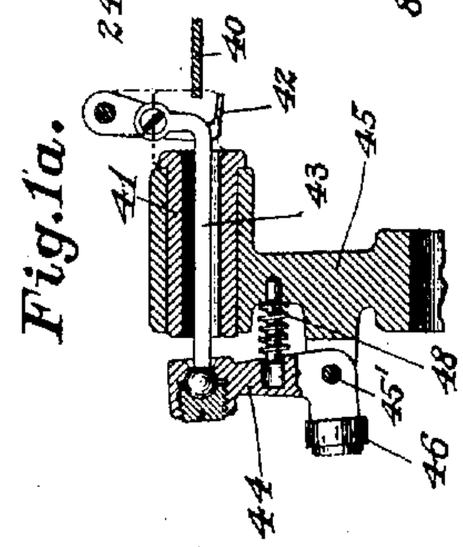


Fig. 1a.



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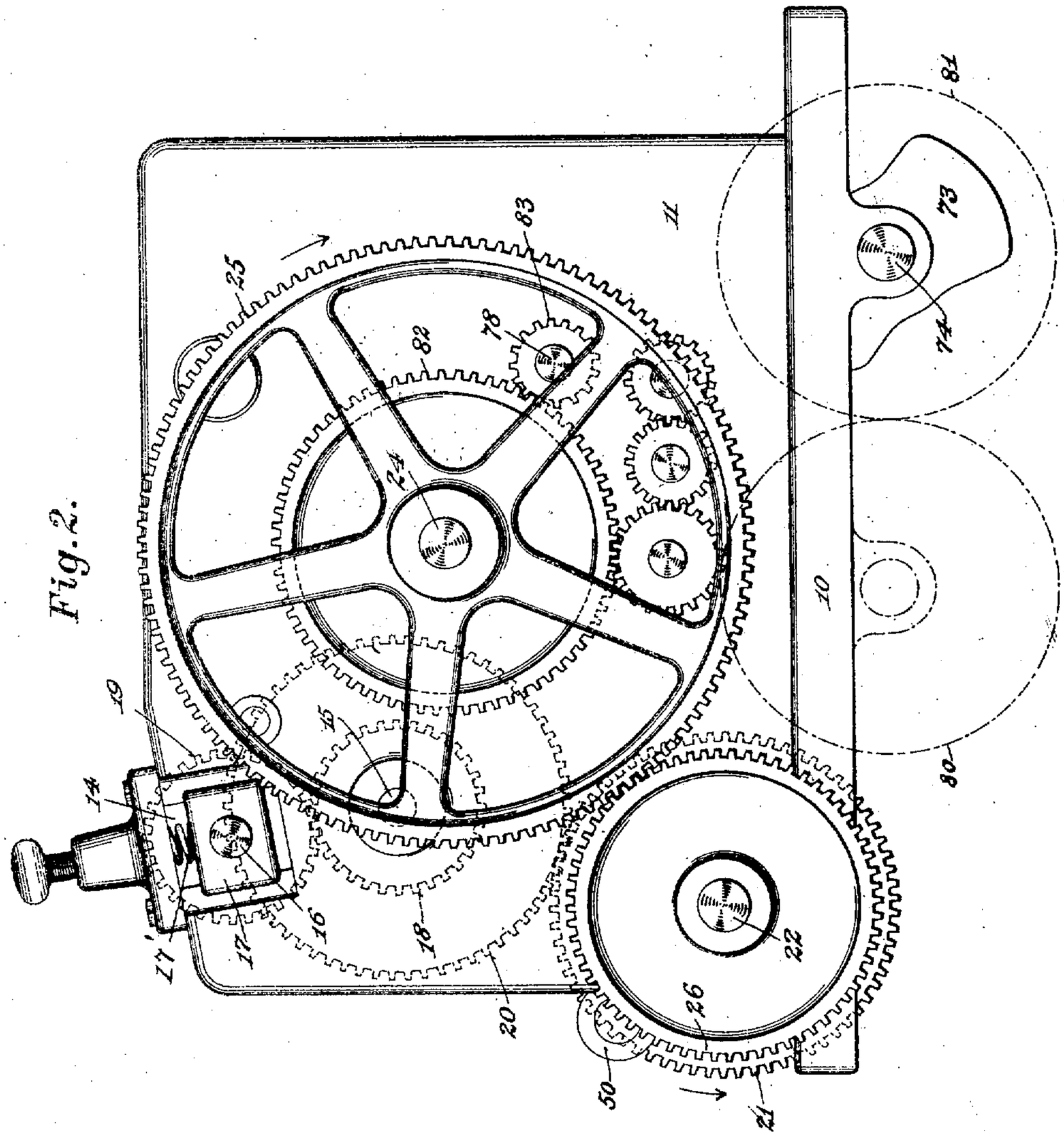
6 SHEETS—SHEET 2.

Fig. 2.



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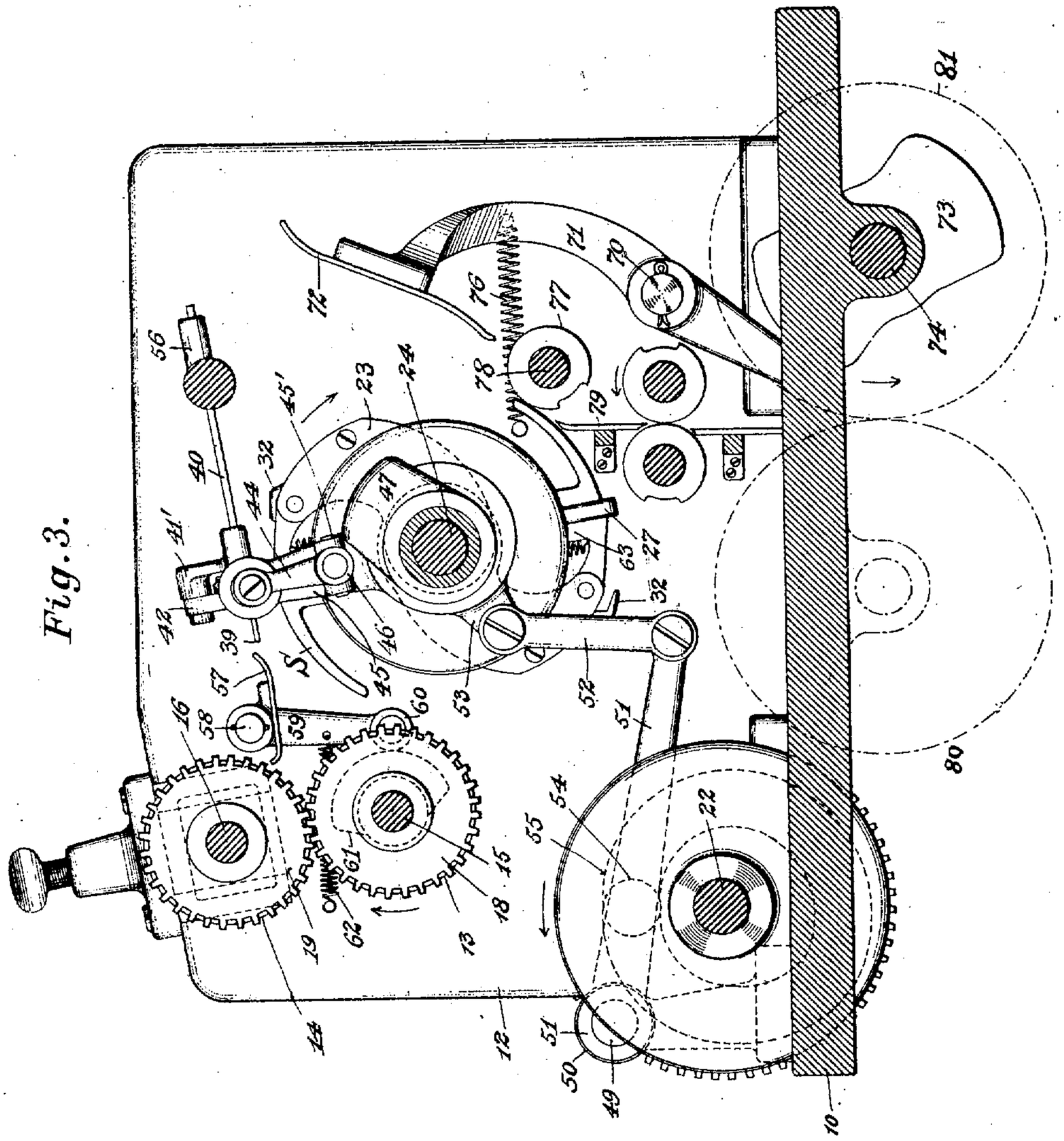
6 SHEETS—SHEET 3.

Fig. 3.



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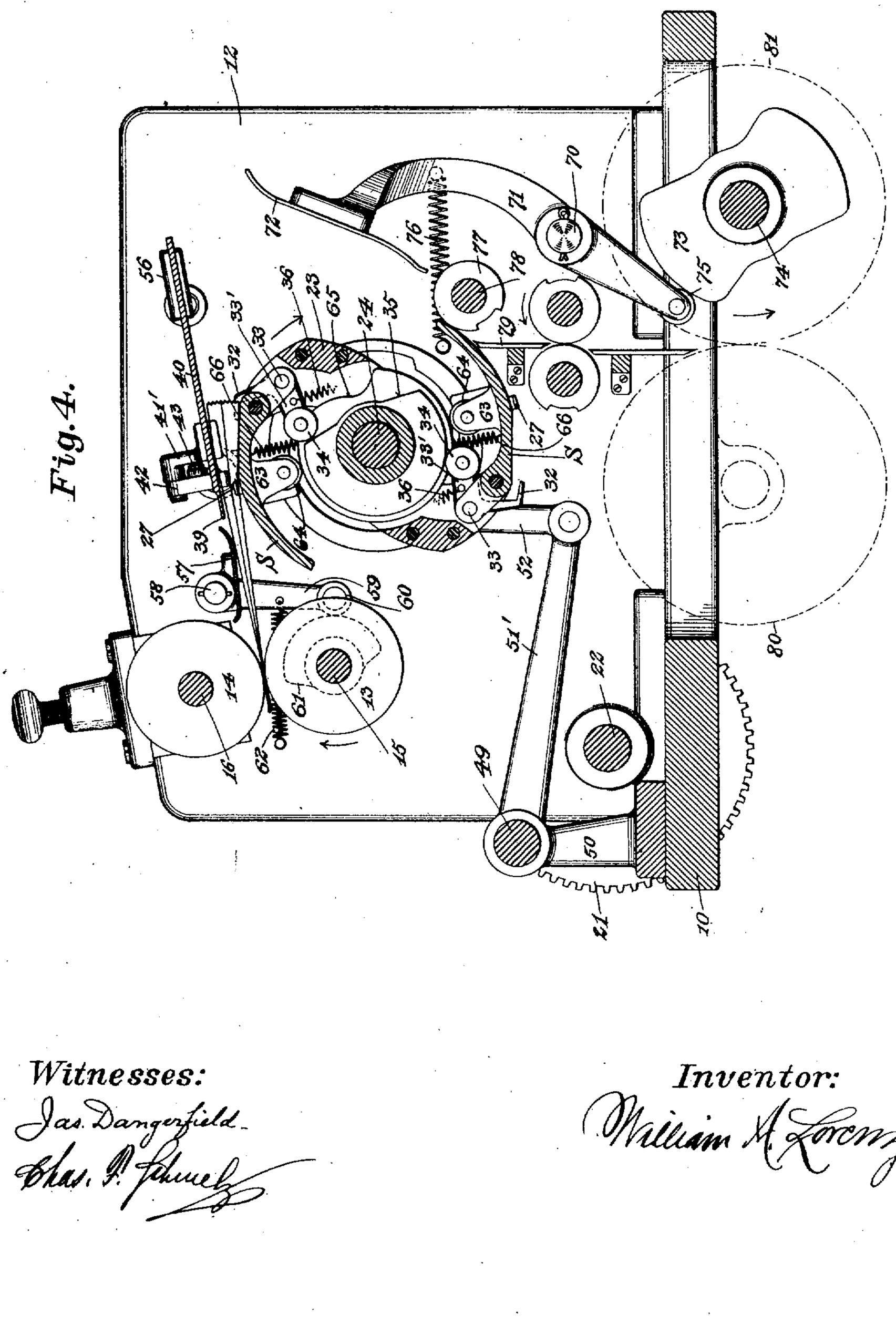
6 SHEETS—SHEET 4.

Fig. 4.



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6 SHEETS—SHEET 5.

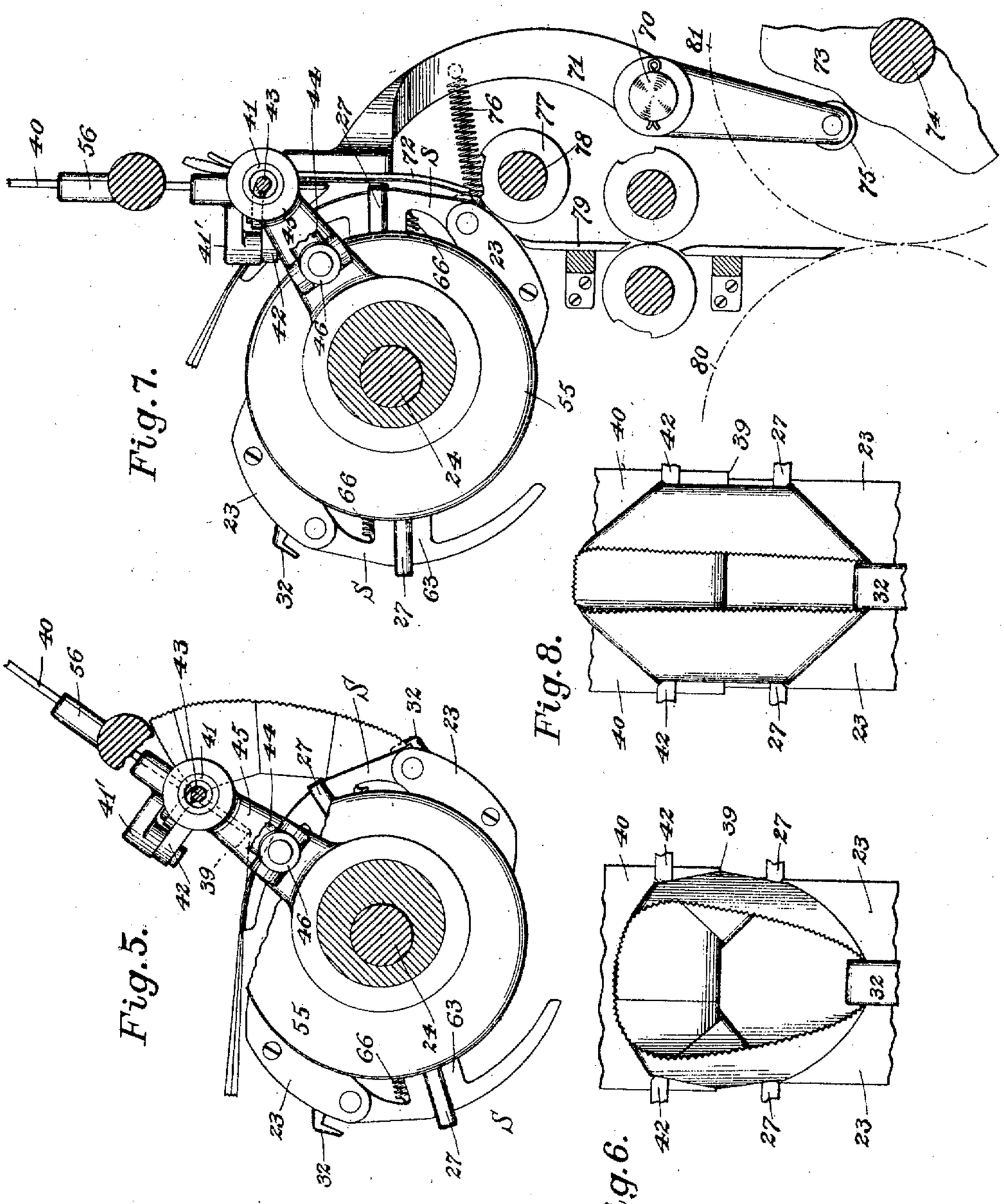

Fig. 7.

Fig. 5.

Fig. 8.

Fig. 6.

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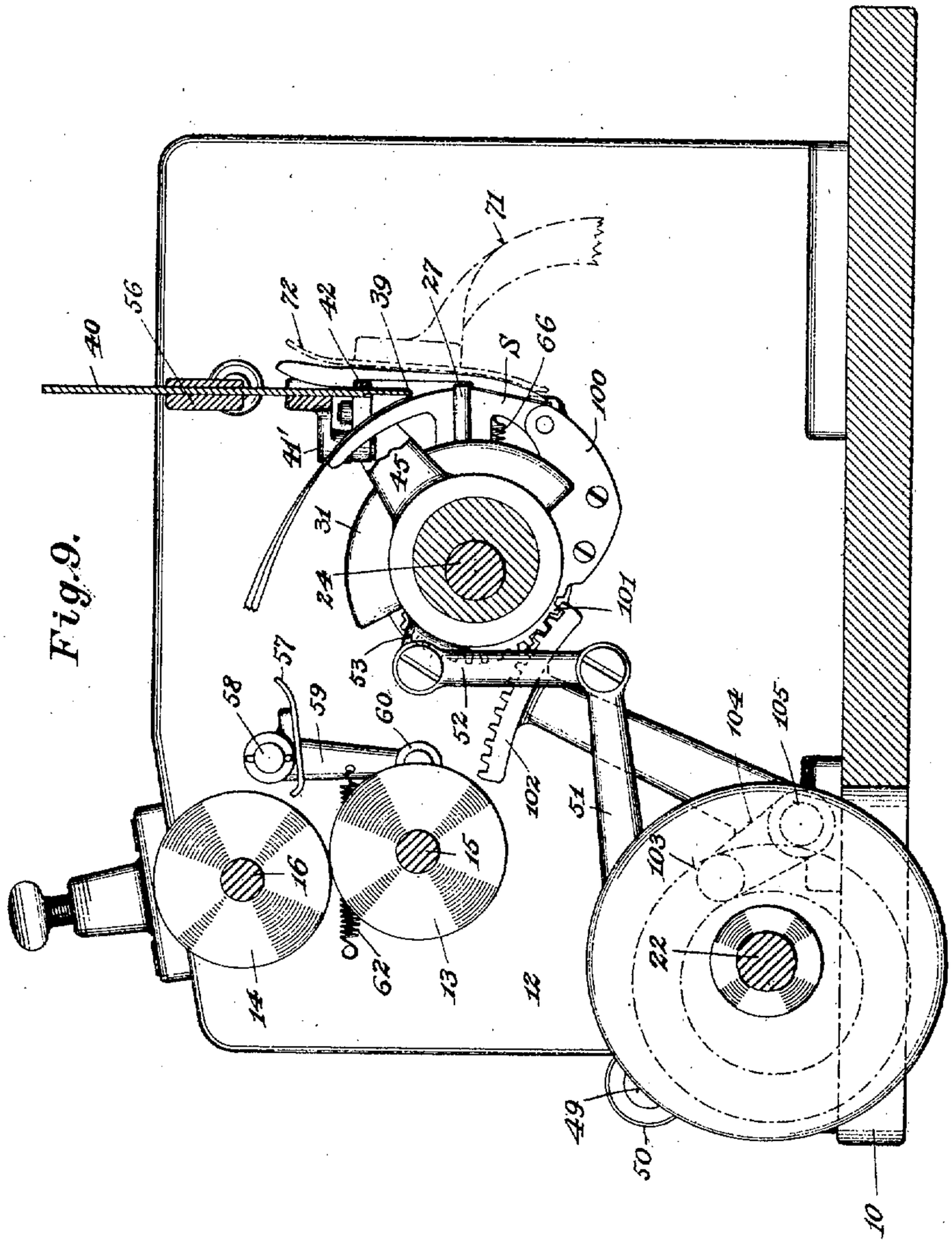
APPLICATION FILED OCT. 5, 1900.

6 SHEETS—SHEET 6

Fig. 9.



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UNITED STATES PATENT OFFICE.

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PAPER-BAG MACHINE.

No. 847,191. Specification of Letters Patent. Patented March 12, 1907.

Application filed October 5, 1900. Serial No. 32,123.

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 particularly to that variety thereof which are employed in forming square-bottom bags from bellows-sided or tucked tubing; and it has for one of its objects the provision of a machine of this character whereby the inner triangular folds are formed while the tucked sides of the bellows-sided tube are distended to a certain degree, after which the diamond is pasted and the flaps are subsequently folded to complete the bag.

My invention comprises as one of its features a blank-folding member having a bottom-defining edge which is maintained at a substantial distance from the blank-supporting surface of a suitable carrier or support during the triangular-fold-forming period, the amount of such distance or of the separation of the tucked tube sides depending upon the material of which the bags are to be made.

Another feature of my invention may be found in the organization of the blank-folding member with its operating mechanism, the former being pivotally supported at a point remote from the defining edge and in an advancing device, so that while its defining edge moves in an orbit around its support-axis the axis itself advances also. The particular advantage derived from this organization is a gain of time in the operation of folding the diamond, this gain being due to the fact that the defining edge is permitted to follow the movement of the blank-carrier for a greater distance than is possible when the supporting-axis of the folding member has no advancing traveling movement. In the latter case the operation of folding the diamond is necessarily limited to a certain amount of linear travel of the blank, while in the present case the diamond-folding operation is continued for a longer period in the linear travel of the blank.

In the drawings accompanying this specification, and in which similar characters designate similar parts, Figure 1 is a front view of my improved machine. Fig. 1ª is a detail view of a box-holder and its operating mechanism. Fig. 2 is a side view thereof looking from the left of Fig. 1. Fig. 3 is a vertical section on line 3 3, Fig. 1. Fig. 4 is a similar section on line 4 4, Fig. 1. Figs. 5 to 8, inclusive, are views on an enlarged scale, Fig. 5 illustrating in detail the blank-carrier and the blank-folding member coöperative therewith in a position where the end of the blank has been opened out sufficiently to form the "box" and the inner triangular folds. Fig. 6 illustrates a front view of the blank opened out as shown in Fig. 5. Fig. 7 is a view similar to Fig. 5, showing the parts in a position when the diamond has been substantially completed by the coaction of the carrier and the folding member and after the drop-plate has flattened the diamond. Fig. 8 is a front view of the blank corresponding to the condition shown in Fig. 7. Fig. 9 is a vertical section of a machine embodying a modification of my invention.

In the drawings, 10 designates a bed-plate, to which are secured two upright side frames 11 and 12, in which the several coöperative shafts for driving the various devices are supported. Suitable means are provided for feeding blanks of bellows-sided tubing into the machine, such means consisting in the present instance of suitable feed-rollers 13 and 14, mounted on shafts 15 and 16, respectively, the latter of which is journaled in boxes 17, movably held in the side frames and acted upon by suitable springs 17′. (See Fig. 2.) The feed-rollers are caused to move together by means of gears 18 19, mounted on the shafts 15 and 16, respectively, and are driven by a gear 20, mounted on the lower roll-shaft and obtaining motion from a similar gear 21, carried on 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 a blank or tube is conducted to a suitable carrier, upon which each blank is retained during the bottom or 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 suitable means are provided for holding the lower ply of the blank

in place on the carrier, both carrier and blank-folding member coacting to open out the end of the blank and form the diamond, as will hereinafter appear. The carrier is in this instance of the rotary type and pivotally carries a piurality of blank-supports, all of the supports coöperating with the same blank-folding member in consecutive order. The carrier 23 is secured 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. In order to obviate any interference between the blank-folding member and the blank-support S, the latter is pivotally held on the carrier 23 and is provided with an inwardly-projecting extension 63, carrying a roller 64, which is adapted to travel around the periphery of a preferably stationary cam 65, while a spring 66 may serve to swing the support S inward around its pivot-support when permitted to do so by the cam 65. The contour of the cam 65 is such as to position the blank-support relatively to the defining edge, so as to maintain the proper required distance between the defining edge 39 and the blank-support S during the triangular fold-forming operation. The means or devices for holding the lower ply of the tube on the support S consist, preferably, of a pair of tuck-holders 27, journaled at 28 on each side of the blank-support and carrying cam-rollers 29, which travel around the periphery of suitable cams 31, causing the tuck-holders to release the blank on both sides simultaneously and at the proper time against the action of springs 30, whereby said tuck-holders are closed against the blank. The support S 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. The arm 33′ of the front diamond-holder 32 carries a roll 34, in engagement with a suitable 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.

The blank-folding member which, as has before been stated, is connected for coöperation with the blank-support, consists, preferably, of a plate one edge of which constitutes the bottom-defining edge and which is mounted for oscillation upon an axis which is carried forward and back in the general direction of travel of the blank-support. While generally a blank-folding member mounted in accordance with my invention—viz., in a carrier which is advanceable with the blank-carrier—may be advantageously employed where the blank-carrier and the defining edge travel in close contact with each other during the working stroke, yet I consider that it is preferable to maintain a substantial degree of separation between the defining edge of the blank-folding member and the blank-support during the time that they coact in opening out the end of the blank to define the so-called "inside triangular folds," so as to stretch out the tucked sides of the tube and define the outer corners and margins of these triangular folds at an early stage in the oscillatory movement of the blank-folding member before the flap of the top and the bottom walls of the blank are separated far enough to put an inward strain upon the adjacent ends of the tucked sides, and thereby cause malformations of the diamond fold. In the present instance both the blank-support and the support-axis of the folding member are capable of advancement, so that the defining edge will travel in unison with the blank-support during a portion of its working stroke, while the outer end of said member may be guided in such a manner as to cause said member to turn around its axis of support.

The blank-folding member herein shown consists of a plate 40, having a defining edge 39 and provided at its sides with brackets having trunnions 41, whereby said plate is pivotally supported at an axis remote from the defining edge. Each of the brackets has an extension 41′, adapted to receive suitable means for engaging the upper ply of the blank and for holding the same against the plate 40. The means for holding the upper ply of the blank against the folding-plate consist in the present instance of devices in the form of side grippers or box-holders 42, each of which enters one of the side tucks of the blank and each of which is pivoted in an extension 41′. The means for causing each of the box-holders and member 40 to approach and separate from each other to grip and release the portion of the blank received between them includes a link or bar-like member 43, having its axis substantially coincident with the axis of the trunnions and passing through the same. (See Fig. 1ª.) The outer end of the link 43 is of spherical form adapted to fit a similarly-formed recess in an angle-lever 44, which is pivoted at 45′ to the trunnion-carrying-arms 45 and carries a roller 46 in engagement with a cam 47, which is preferably stationary and which serves to close the box-holders against the upper ply of the blank at the proper time, while a spring, such as 48, may be employed for opening the same. Each of the arms 45 is loosely and preferably eccentrically mounted relatively to the axis of the blank-carrier, as indicated in Fig. 5 and as is also shown more clearly in Fig. 9, and both arms 45 may obtain a proper oscillatory movement, so as to move in unison and to advance with the carrier by a shaft 49, journaled in bearings 50 and carrying at its outer ends crank-arms 51 51′, connected by means of links 52.

with lugs 53, secured to or forming a part of the arms 45. One of said crank-arms—as, for instance, 51—may carry a roller 54, engaged by a cam 55, mounted upon the main shaft 22 of the machine. It will now be understood that both arms 45 will be operated by the cam 55, so as to move in unison, and thus guide one end of the folding member or plate 40, and that the defining edge has a forward swinging movement, while at the same time the axis of support of the folding-plate is also advancing. It will thus be seen that the arms 45 constitute supporting means by which the trunnions 41 and the folding mechanism or devices carried by said trunnions are advanced with each blank as the diamond folding operations are performed on such blank. The rear end of the folding member is preferably supported in a pivoted guide 56, in which it may have a reciprocatory sliding movement. The other end of the plate, forming the defining edge 39, is caused to travel in a path separated or divergent from that of the blank-support.

Interposed between the feed-rolls 13 14 and the carrier 23 is a guide-plate 57, 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 blank-support, and in order to permit such blank to avoid the edge of the folding member as it returns to its blank-receiving position the guide-plate 57 is movably supported near one end of a shaft 58, receiving rocking movement through a lever 59 and a roll 60 from a cam 61, mounted upon the shaft 15 of the lower feed-roll 13, a spring 62 serving to keep said roller in engagement with the cam 61.

Secured to the side frame 12 is a stud 70, on which is journaled intermediate its ends a lever 71, carrying at one end a drop-plate 72, adapted to coöperate with the blank-support S in flattening and completing the diamond. The lever 71 may be actuated by a cam 73, secured to a shaft 74 and engaging the cam-roller 75, journaled on the lever 71, while a spring 76 may be employed to force the drop-plate 72 against the diamond. After the diamond has been flattened by the drop-plate the blank may be carried into contact with a presser-roll 77, mounted upon a shaft 78, after which a delivery-plate 79 may deflect the blank from the carrier and conduct the same to other devices, which may include pasting and flap-folding devices 80 81, whereby the blank is transformed into the completed bag. Proper rotary movement may be imparted to the shaft 78 by a gear 82, mounted upon the carrier-shaft 24 and driving the pinion 83, screwed upon said shaft 78.

In Fig. 9 I have shown a modification of my improved machine, which in this instance includes an oscillatory carrier instead of a rotary device, as above 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 a cam-roller journaled on the arm 104 of the sector 102, the latter being pivoted at 105 on the bed-plate of the machine.

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 57 between the blank-folding member 40 and the blank-support S in such a manner that the tuck-holders 27 and the front diamond-holder 32 will engage the lower ply of the blank shown in Fig. 3, and it will thus be carried along by the blank-support in the direction of the arrow. While the blank is delivered to the tuck-holders 27 the box-holders 42 of the blank-folding member 40 are open, and the movement of the latter with the box-holders is so timed relatively to the blank-support that the front edges of the tuck-holders and of the box-holders will be in alinement with each other when they grip the blank, after which both the blank-support and the defining edge of the blank-folding member will travel in unison during the formation of the diamond. In Fig. 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 Fig. 7 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. The box-holders are then disengaged from the blank, and the blank-folding member will then return to its blank-receiving position, while the blank is drawn forward from under the drop-plate 71 and carried into contact with the presser-roll. The front diamond-holder and the tuck-holders then release the blank, which is then deflected by the plate 79 toward the pasting and flap-folding devices, whereby the bag is completed.

It is evident that 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. While I have shown and described the blank-folding member coöperative with a rotary blank-carrier, it should be understood that other forms of carrier may be substituted therefor.

In my prior application, Serial No. 27,864, filed August 23, 1900, I have shown, described, and claimed certain combinations shown and described but not claimed in this application. In so far as this application shows novel features in common with said prior application it is to be regarded as subordinate to said prior application.

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

1. The combination, with 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 the edge, means for causing the advance movement of the blank-folding member, and of its supporting means, with the blank-support, and means independent of and extraneous to the blank-support for oscillating said member in its support.

2. The combination, with 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 the edge; means for oscillating said member in its support; and means for advancing the pivot-support of the folding member with the blank-support during the diamond-forming operation.

3. The combination with a movable blank-support, of tuck-holders, a blank-folding member having a defining edge, means for supporting said member for oscillation upon an axis remote from said edge, means for moving the blank-folding member forward in the general direction of movement of the blank-support, means for oscillating said member on its axial support, and means for moving the blank-support to effect a substantial separation between the defining edge and the blank-support during the formation of the inner triangular folds.

4. The combination with a movable blank-support, of tuck-holders, a blank-folding member having a defining edge, means for supporting said member for oscillation on an axis remote from said edge, means for oscillating said member on its axial support, means for advancing the said axial support in the general direction of travel of the blank-support during the diamond-forming operation, and means for moving the blank-support to effect a substantial separation between the defining edge and the blank-support during the formation of the inner triangular folds.

5. The combination with a movable carrier having a relatively movable blank-support, of tuck-holders, a blank-folding member having a defining edge, means for supporting said member for oscillation on an axis remote from the defining edge, means for oscillating the said member in its support, means for moving and positioning said blank-support at a substantial distance from the defining edge during the formation of the inner triangular folds, and means for advancing the axial support relative to the direction of travel of the blank-support.

6. The combination, with a movable carrier; and a movable blank-support having tuck-holders; of an oscillatory blank-folding member having box-holders and a defining edge; means for pivotally supporting said member on an axis remote from the defining edge; means for oscillating said member in its support; and means for moving the pivotal support of the folding member forward relative to the direction of movement of the blank-support during the diamond-forming operation.

7. The combination, with a movable blank-carrier, of a movable blank-support controlled by the movement of the carrier, and having tuck-holders, an oscillatory blank-folding member having box-holders and a defining edge, means for pivotally supporting said folding member on an axis remote from its defining edge, means for oscillating said folding member in its support, and means for moving the pivotal support of the folding member forward relative to the direction of travel of the blank-support, during the blank-folding operation.

8. The combination, with a blank-support having tuck-holders; of an oscillatory blank-folding member coöperative therewith and having a defining edge and box-holders; means for pivotally supporting said member on an axis remote from the defining edge; and a pivoted guide for guiding the oscillatory movement of said member.

9. The combination with a movable blank-support having tuck-holders, of an oscillatory blank-folding member coöperative with the blank-support, and having a defining edge and box-holders, arms mounted for oscillation and supporting said member for oscillation on an axis remote from the defining edge, and a pivot-guide for guiding the oscillatory movement of the folding member.

10. The combination with an axially-mounted carrier and a movable support having tuck-holders, of an oscillatory blank-folding member coöperative with the blank-support, and having a defining edge and box-holders, arms mounted for oscillation on an axis which is in eccentric relation to the axis of the carrier, and supporting the folding member for oscillation upon an axis remote from the defining edge, means for oscillating the arms, and a pivoted guide for guiding the oscillating movement of the blank-folding member.

11. The combination with an axially-mounted carrier, and a movable blank-support having tuck-holders, of a coöperating blank-folding member having a defining edge and box-holders, arms mounted for oscillation upon an axis eccentric to that of the carrier, and supporting the said folding member for oscillation on an axis remote from the defining edge, a cam for moving the said arms forward relative to the direction of travel of the carrier, and means for guiding the oscillatory movement of the folding member.

12. The combination with a blank-carrier

having a relatively movable blank-support, of tuck-holders, an oscillatory folding member coöperative with the blank-support and having a defining edge, and means for moving the movable support to maintain a substantial degree of separation between said edge and the movable support during the folding operation.

13. The combination with a movable carrier, of a blank-support having tuck-holders, and movably supported on said carrier, a blank-folding member having a defining edge and box-holders, movable means supporting the blank-folding member for oscillation, and a cam for moving the blank-support in a path separated from that of the defining edge of the folding member during the operation of forming the inner triangular folds.

14. The combination with a movable carrier, of a movable blank-support having tuck-holders, a blank-folding plate having a defining edge and box-holders coöperative therewith, means for supporting said plate for oscillation upon an axis remote from said defining edge, means for guiding the oscillatory movement of said plate, and means for guiding the blank-support at a substantial distance from the defining edge during the formation of the inner triangular folds.

15. The combination, with a rotary carrier having a blank-support; and tuck-holders coöperative therewith; of an oscillatory blank-folding member having box-holders; means for operating the box-holders comprising a link having its axis substantially coincident with the axis of support of the folding member; and means for operating said link.

16. The combination, with a rotary blank-carrier having a blank-support; and tuck-holders coöperative therewith; of an oscillatory blank-folding member having box-holders; means for operating the box-holders comprising a link having its axis substantially coincident with the axis of support of the folding member; and a cam for operating said link.

17. The combination, with a rotary blank-carrier having a blank-support; and tuck-holders coöperative therewith; of an oscillatory blank-folding member having box-holders; and means for operating the box-holders comprising a lever and a link having its axis substantially coincident with the axis of support of the folding member and connected to said lever by a universal joint; and means for operating said lever.

18. In a bag-machine, mechanism for forming diamond folds on bellows-sided blanks, including in combination a rotary folding-bed, tuck-holders, an arm, means for moving said arm with the bed during the folding operation on a blank, a hollow shaft journaled on said arm, folding mechanism including a box-holder mounted on said shaft, means for turning said shaft relative to said arm as the latter moves with the bed, and means for opening and closing said box-holder, including a lever supported on said arm, a link connecting said lever and box-holder, and cam mechanism for oscillating said lever as said arm moves with the bed.

19. In a bag-machine, mechanism for forming diamond folds on bellows-folded blanks, having in combination a rotary folding-bed, means for holding the lower ply of the bag-blank to the folding-bed oscillating arms moving about a center of oscillation located within the rotary path of the bed, cam mechanism for oscillating the arms, located outside of the rotary path of the bed, and connected to the arm by connecting-rods, folding mechanism moved by said arms through an oscillatory path above the rotary bed, and means for operating the folding mechanism to open the blanks during their movement with the bed.

20. In a bag-machine, mechanism for forming diamond folds on bellows-folded blanks, having in combination a rotary carrier, a blank-support mounted for oscillation upon and for revolution with the carrier, the blank-support being provided with means for engaging the lower ply of the bellows-folded blank, and folding mechanism mounted for oscillation upon an axis situated within the path of revolution of the blank-support; and also mounted for oscillation upon an axis situated outside of that path of revolution.

21. In a bag-machine, mechanism for forming diamond folds on bellows-folded blanks, having in combination a rotary carrier, a blank-support mounted for oscillation upon and for revolution with the carrier, and provided with devices for engaging the lower ply of the bellows-folded blank, oscillating arms moving about a center of oscillation located within the path of revolution of the blank-support, folding mechanism mounted for oscillation upon the said arms upon an axis situated outside of the said path of revolution, and including devices for engaging and turning back the upper ply of the blank as it is carried forward by the blank-support.

22. In a bag-machine, mechanism for forming diamond folds on bellows-folded blanks, having in combination a rotary carrier, a folding-bed mounted for oscillation upon and for revolution with the said carrier, provided with a diamond-holder 32 and tuck-holders 27 for engaging the lower ply of the bellows-folded blank, arms supported for oscillation upon an axis located within the path of revolution of the blank-support, and folding mechanism mounted for oscillation upon the said arms upon an axis situated outside of the said path of revolution, and

provided with box-holders 42 for engaging and turning back the upper ply of the blank to form the diamond folds.

23. In combination with a movable blank-carrier having tuck-holders and with an oscillatory blank-folding member having a defining edge and box-holders, of supporting means pivotally supporting said member at a point remote from said edge and movable transversely of and also with the blank-carrier.

24. The combination, with a blank-carrier having tuck-holders, of an oscillatory blank-folding member having a defining edge and box-holders, said member being pivoted at an axis remote from said edge, a carrier supporting the blank-folding member, and for moving the pivot-axis of said member away from and toward the blank-carrier, and means independent of the blank-carrier for advancing said pivot-axis with the blank-carrier during the diamond-forming operation.

25. The combination, with a rotary blank-carrier having tuck-holders, of an oscillatory blank-folding member having a defining edge and box-holders, said member being pivoted at an axis remote from said edge, means independent of the blank-carrier for moving said pivot transversely relatively to and also with the blank-carrier during the diamond-forming operation.

26. The combination, with a movable blank-carrier having tuck-holders, of an oscillatory blank-folding member having a defining edge and box-holders, said member being pivoted at an axis remote from said edge, a movable carrier supporting the blank-folding member, means for oscillating said member in its carrier, and a cam-operated actuator for advancing said carrier with the blank-carrier during the diamond-forming operation.

27. In a bag-machine, mechanism for forming diamond folds on bellows-sided blanks, including in combination a rotary folding-bed, means for securing a bag-blank thereon, an arm, means for oscillating said arm about a center of oscillation within the rotary path of the folding-bed, a hollow shaft journaled in said arm, folding mechanism supported by said arm and including a member for engaging the outer surface of the upper ply of the blank, and a coöperating gripping device entering the side tuck of the blank, means for causing said device and member to approach and separate from each other to grip and release the portion of the blank between them, said last-mentioned means including a lever pivotally supported on said arm and a coöperating member located in said hollow shaft, and means for turning said shaft relative to said arm as the latter oscillates.

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Witnesses:
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