J. MERRITT.

PAPER BAG MACHINE.

APPLICATION FILED JULY 10, 1907.

995,477.

Patented June 20, 1911.

6 SHEETS—SHEET 1.

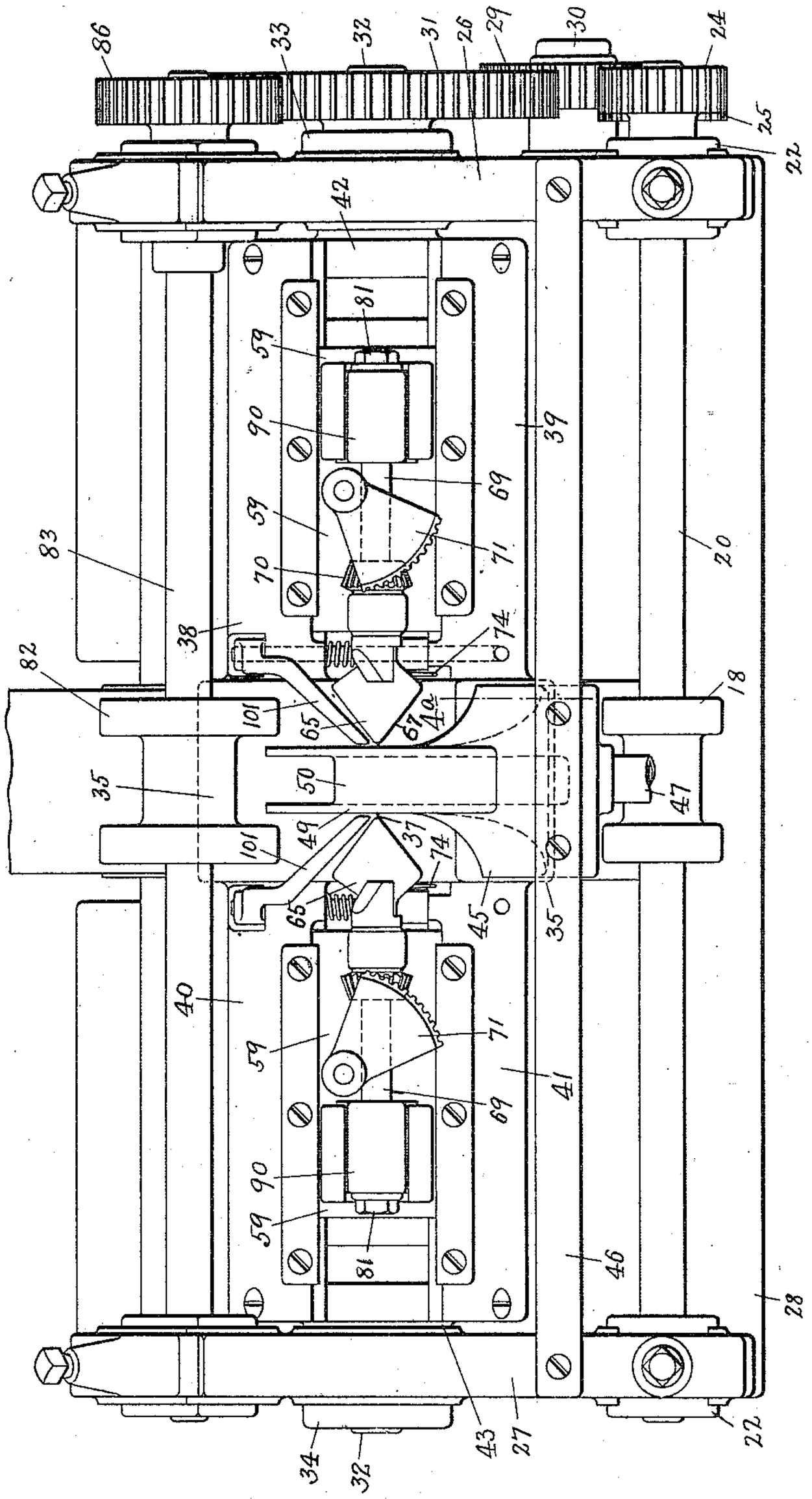

Fig. 1.

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C. F. Storm

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By Wm. H. Honiss Atty

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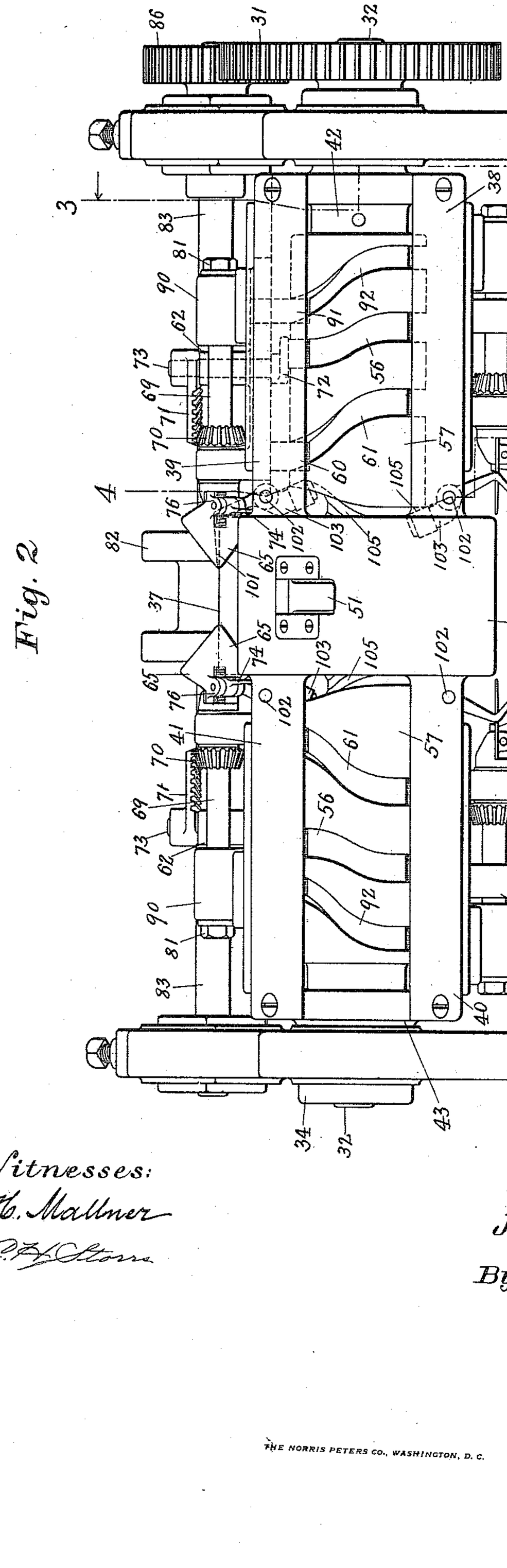

Fig. 2

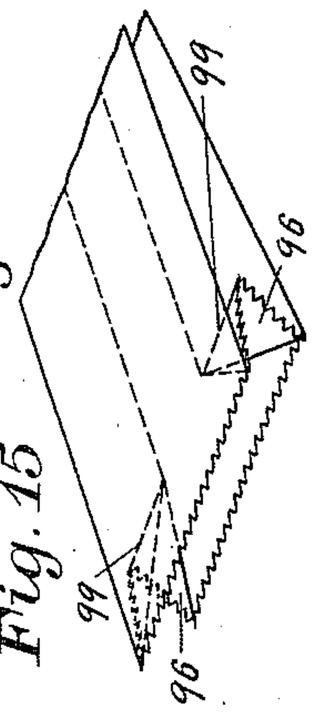

Fig. 15

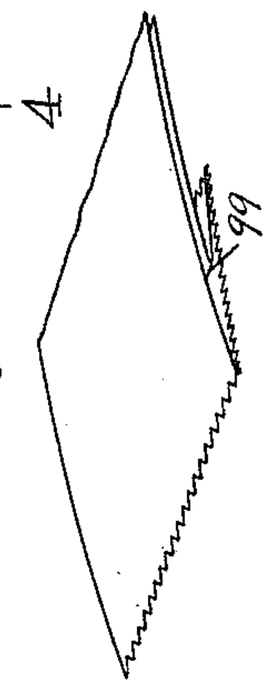

Fig. 14

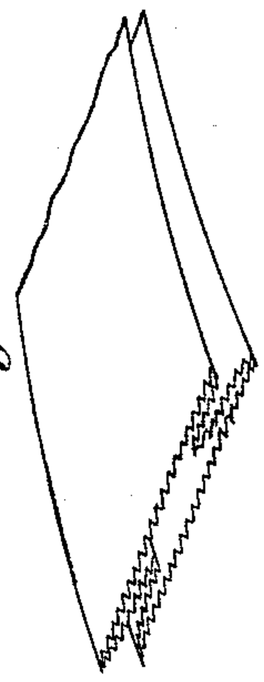

Fig. 13

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6 SHEETS—SHEET 3.

Fig. 3

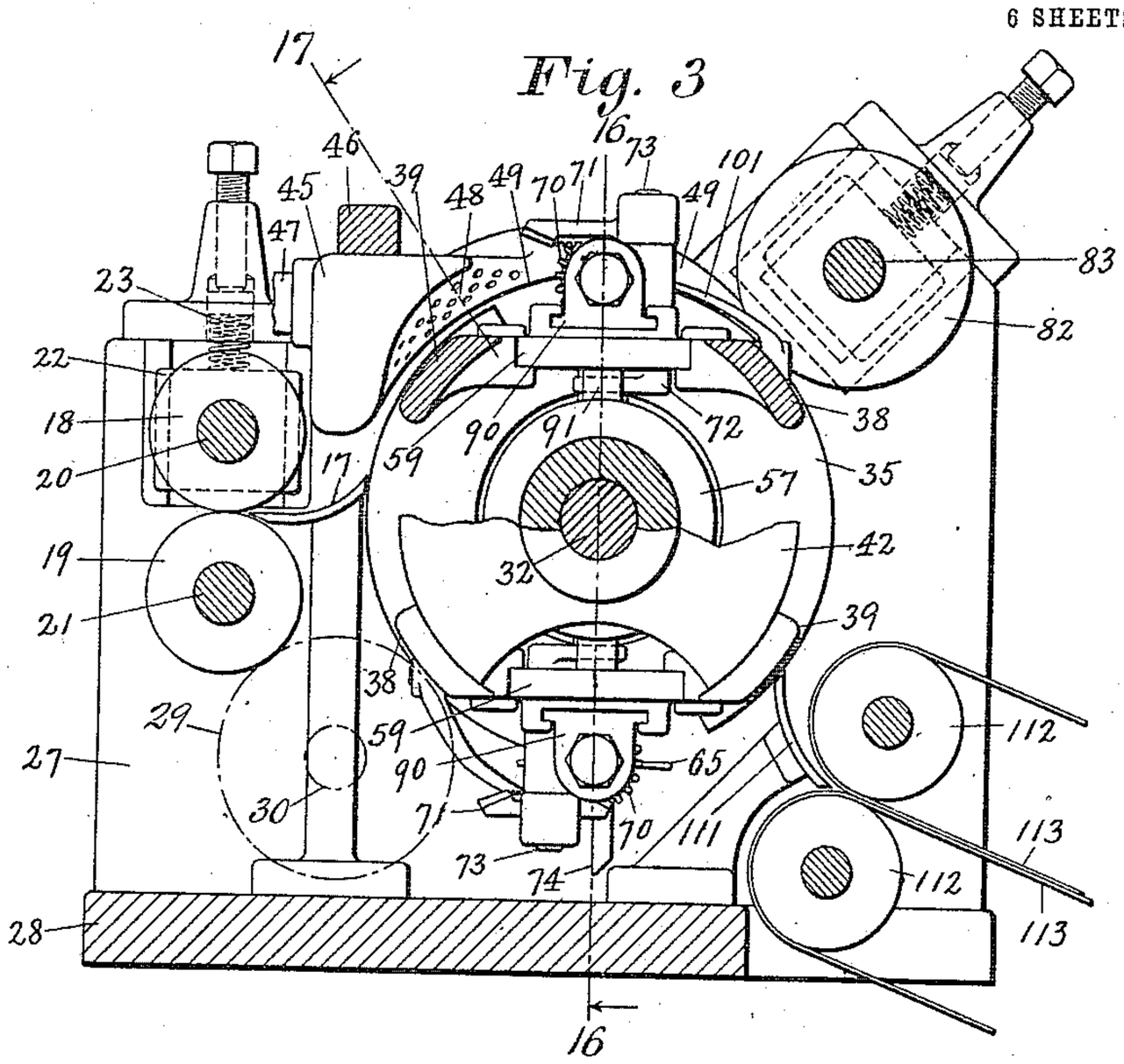
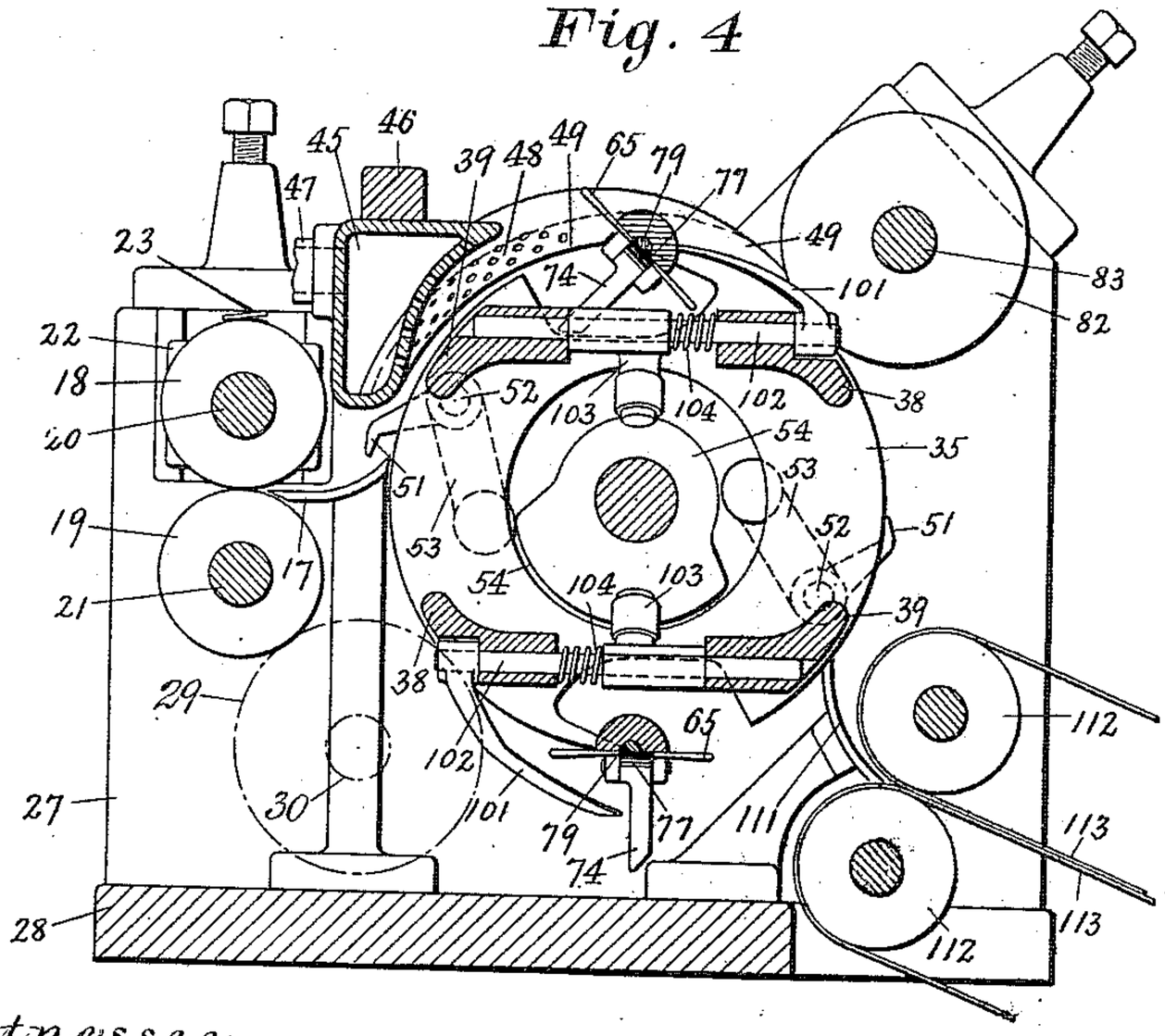


Fig. 4



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6 SHEETS—SHEET 4.

Fig. 5

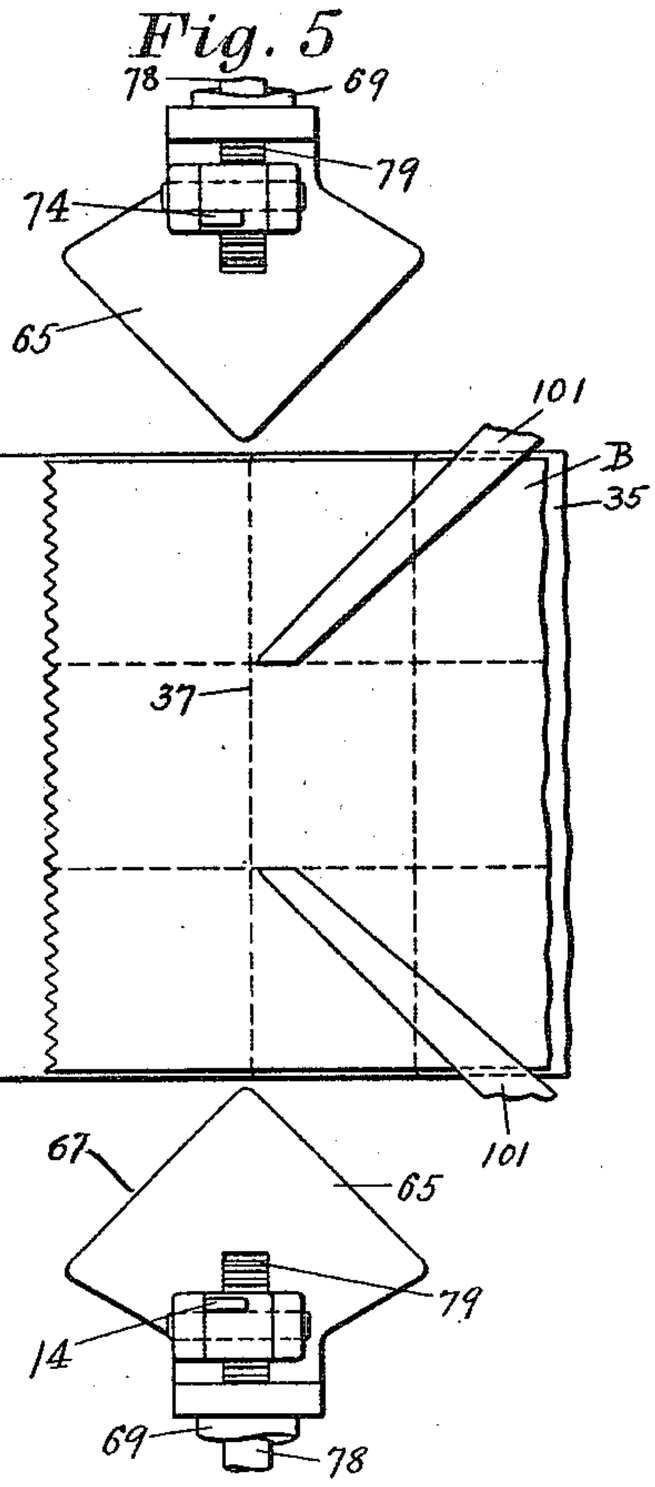


Fig. 7

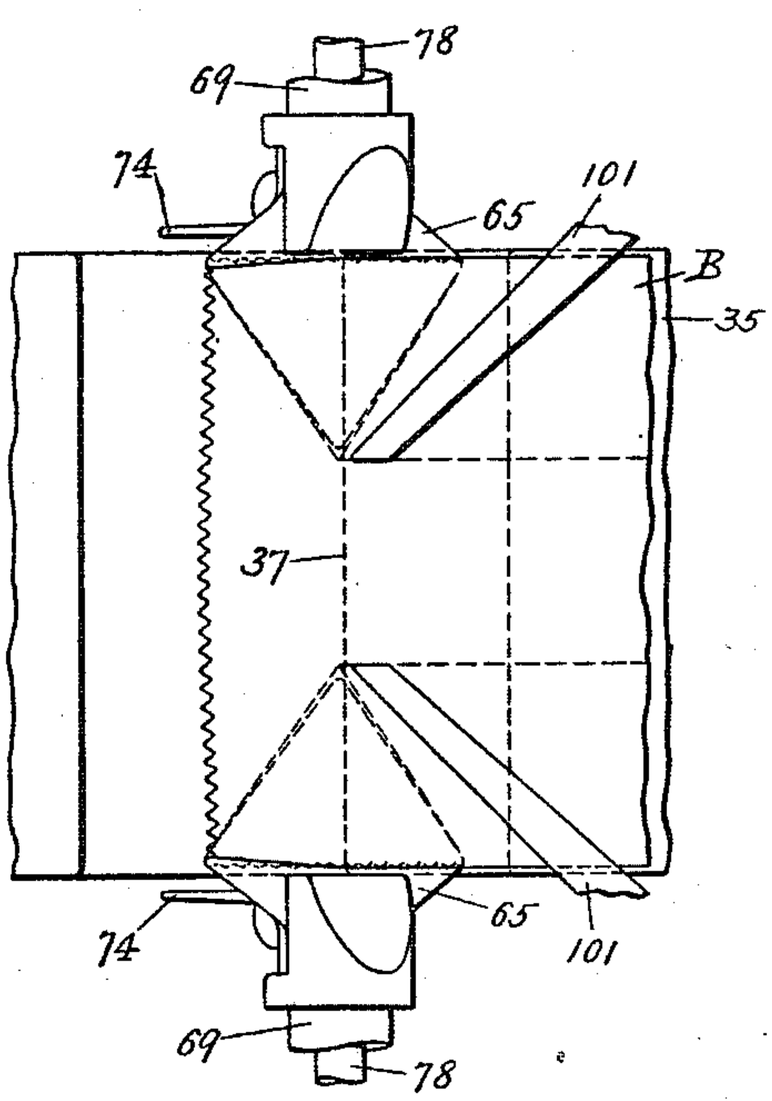


Fig. 6

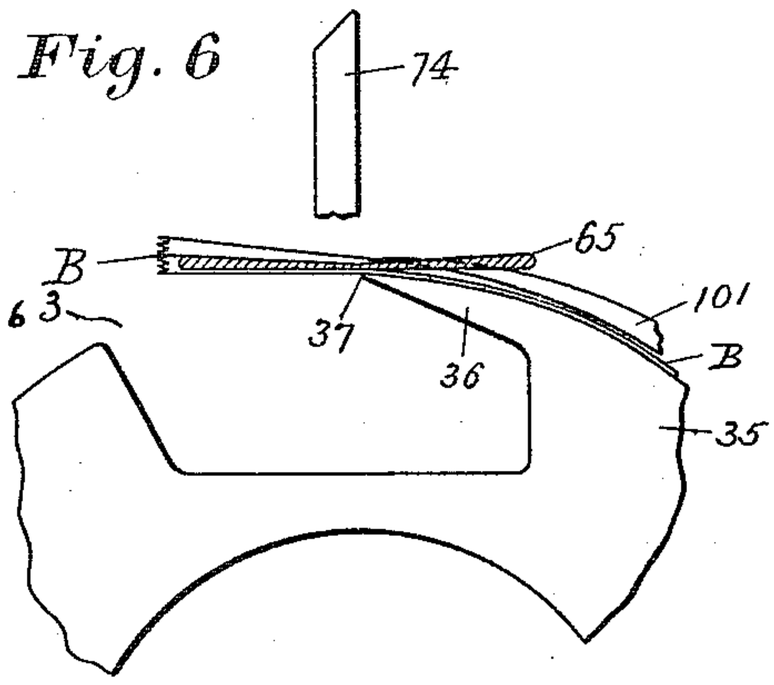
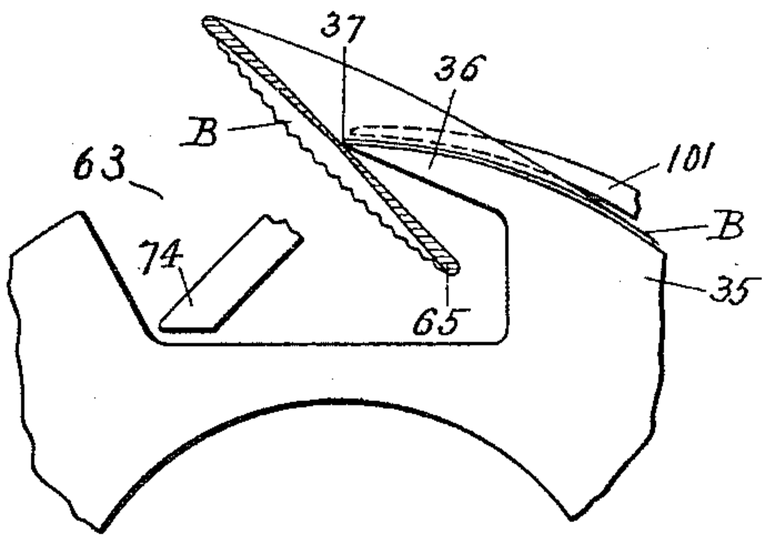


Fig. 8



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PAPER BAG MACHINE.

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6 SHEETS—SHEET 5.

Fig. 9

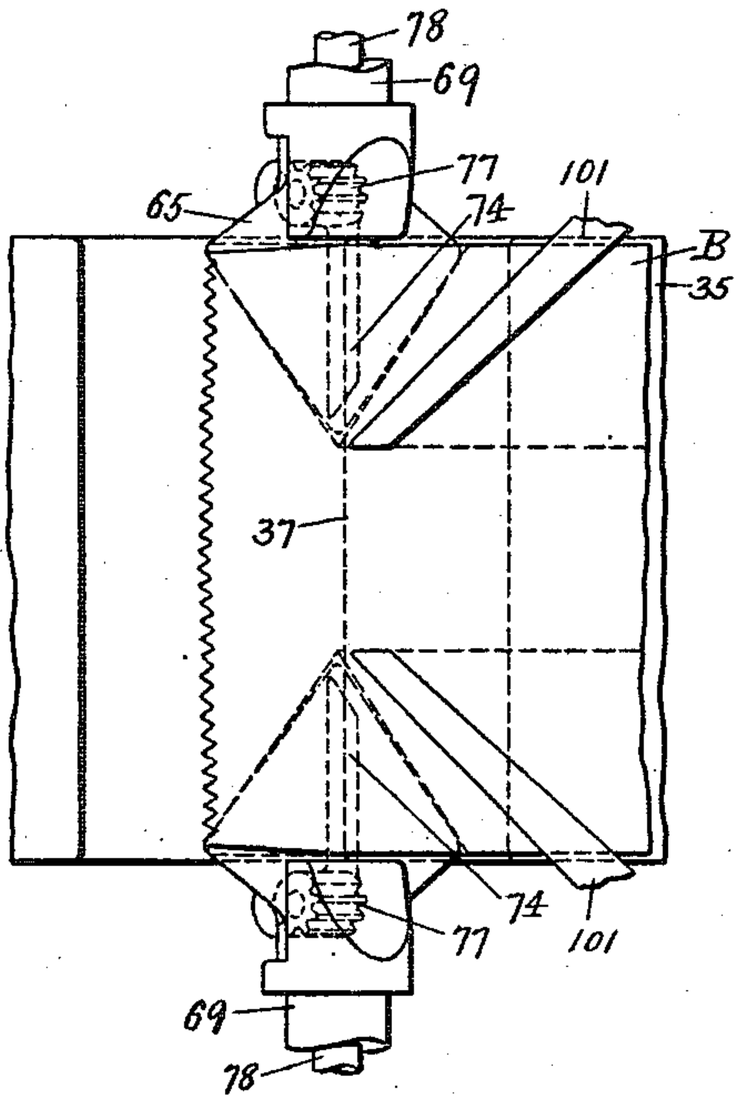


Fig. 11

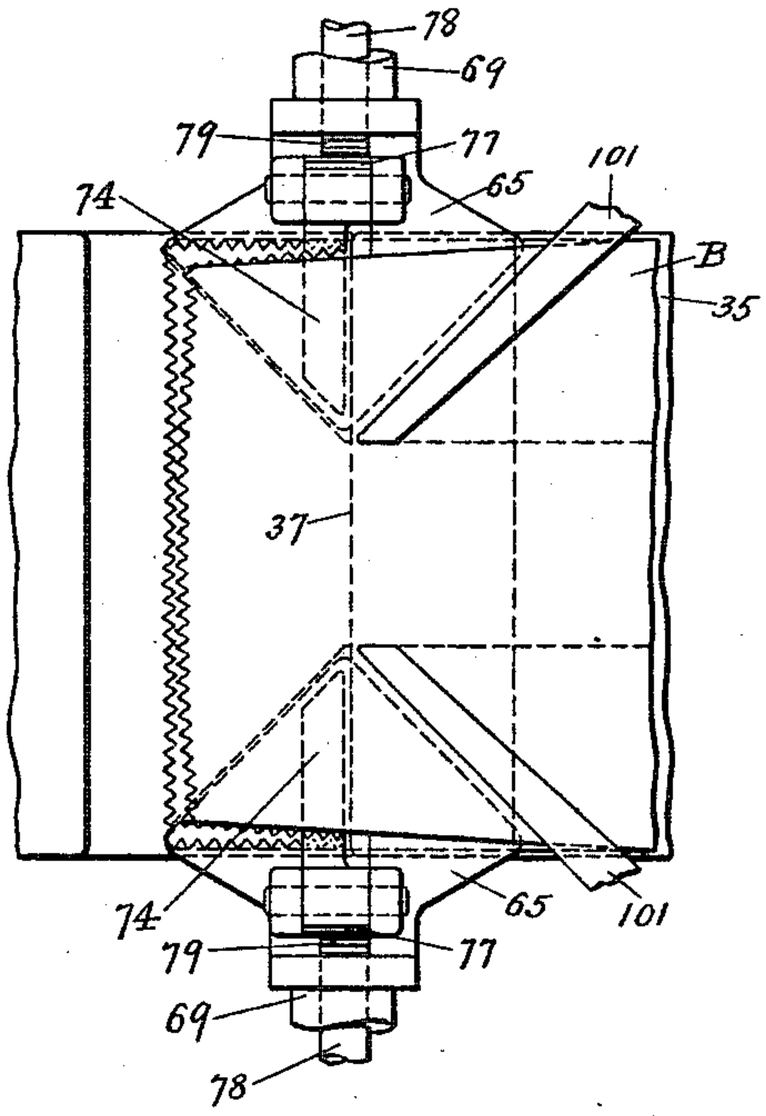


Fig. 10

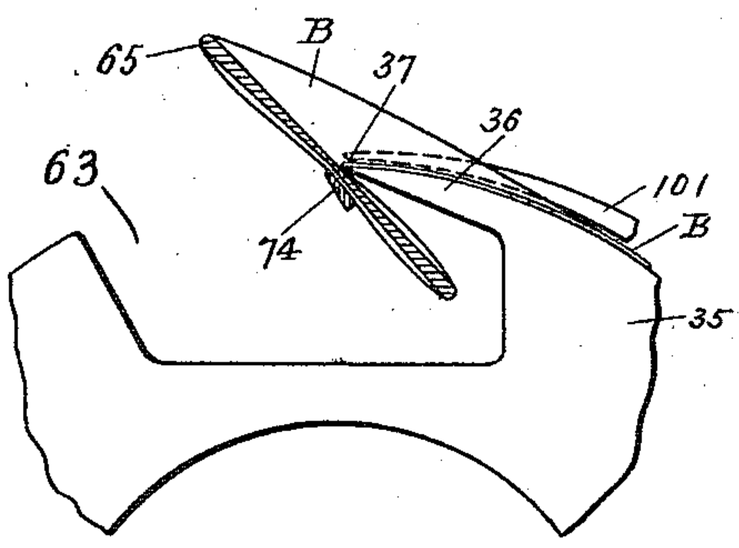
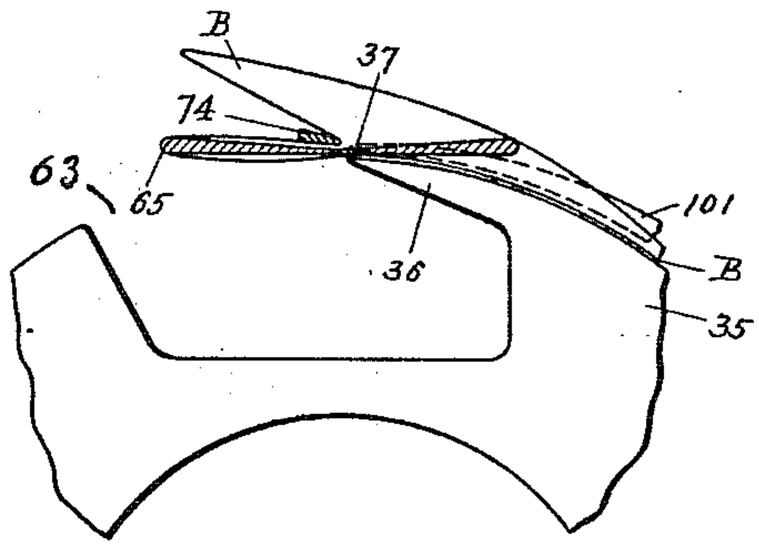


Fig. 12



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PAPER BAG MACHINE.

APPLICATION FILED JULY 10, 1907.

995,477. Patented June 20, 1911.

6 SHEETS—SHEET 6.

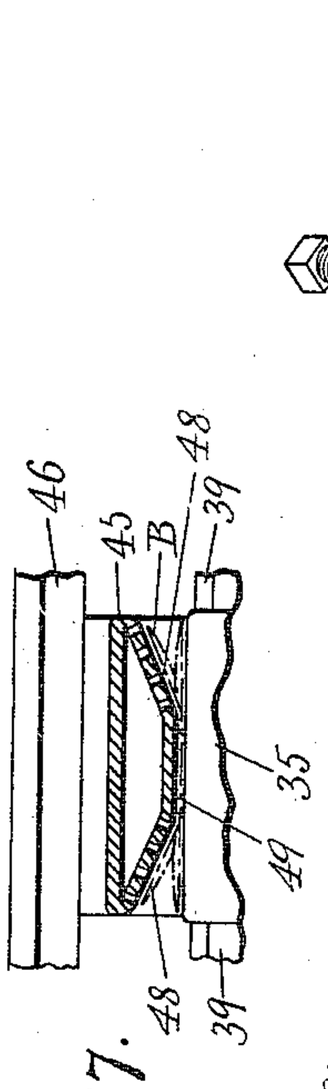

Fig. 17.

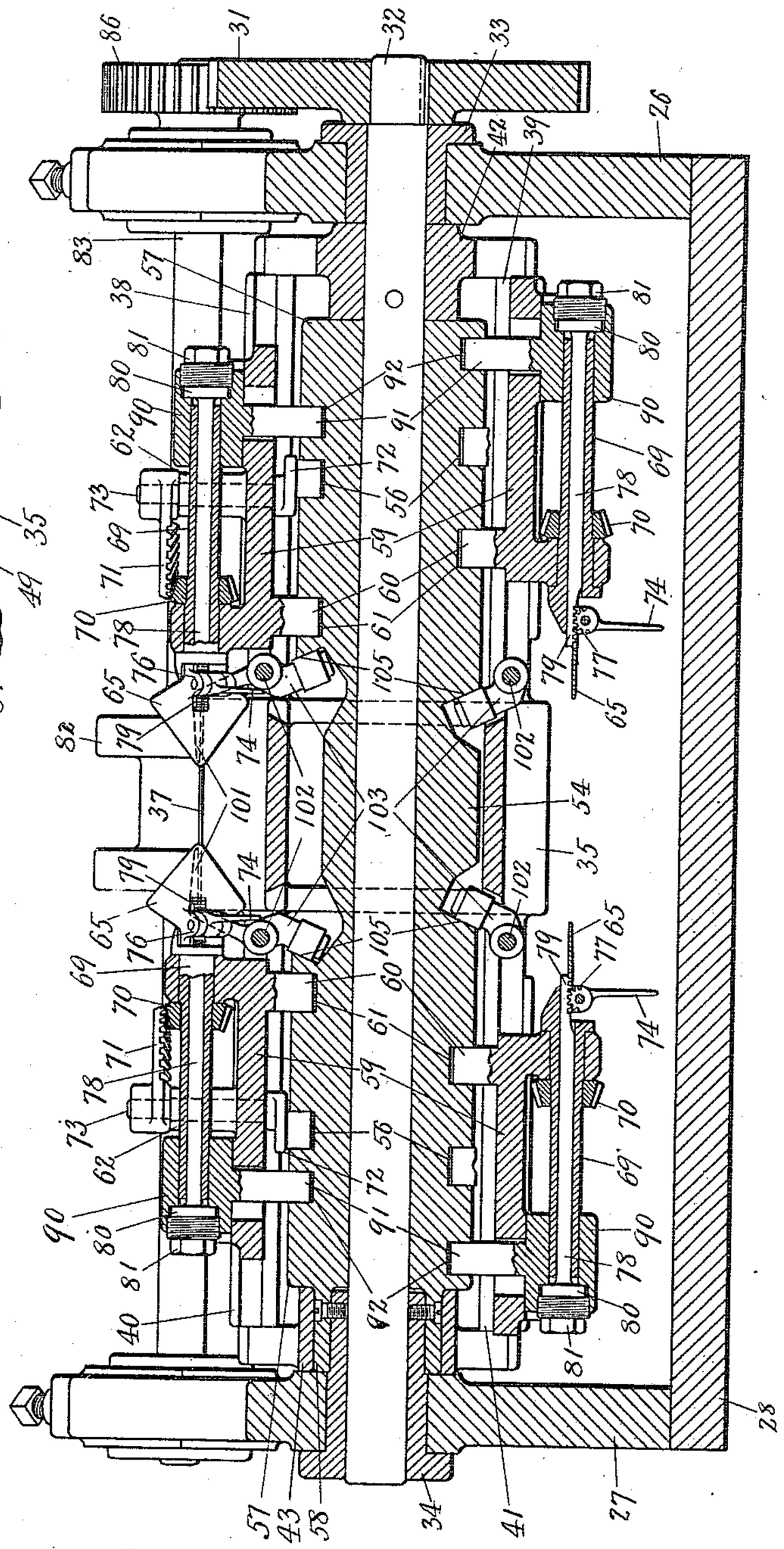

Fig. 16.

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UNITED STATES PATENT OFFICE.

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PAPER-BAG MACHINE.

995,477. Specification of Letters Patent. **Patented June 20, 1911.**

Application filed July 10, 1907. Serial No. 383,041.

To all whom it may concern:

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

The object of this invention is to provide automatic mechanism for forming in the open or mouth end of the side tucks of bellows-sided paper bags, or paper bag blanks, certain reversed folds which are shown and described in Letters Patent of the United States to H. M. Farnsworth, 355,010 dated Dec. 28, 1886, so that when the bag is opened for use, these particular folds are turned outwardly, instead of inwardly, and thus present a flaring or funnel-shaped mouth to facilitate filling the bag. These folds also assist in maintaining the mouth of the bag in an open condition. For this purpose the upper or mouth ends of the inwardly tucked bellows plies of the blank are reversed by turning them outwardly upon the inner bellows fold lines, which are thus swung outwardly to positions approximately 90 degrees from their former positions. The machine of the present invention produces these folds by first turning over one of the flat side walls of the bag or blank over a transversely disposed defining edge, thereby opening the mouth ends of the tucked bellows plies into flattened triangular plies. Then a pair of fingers, herein designated as the reversing fingers, are brought against these opened triangular plies, which are then doubled upon themselves by the turning back of the doubled over side wall, the reversing fingers serving to prevent the inner fold lines from returning to their original positions.

This invention may be embodied in an independent machine by providing it with a suitable driving mechanism, and by providing means for feeding the blanks or bags to it in proper sequence and register; but I prefer to embody the invention in a machine which operates in conjunction with mechanism for folding the bottoms of paper bags from bellows-sided blanks thus embodying in a single organization an automatic machine for rapidly manufacturing bellows-sided paper bags having these mouth folds. When thus employed in such an organization the machine of my present invention may perform its operations before the bottom of the bag has been formed, or it may, as herein shown, receive the bags after the bottom-forming mechanism has completed the bottom folds.

Figure 1 of the drawings is a plan view of a machine embodying the present invention. Fig. 2 is a front view of the machine of Fig. 1, with a portion of the mechanism removed. Fig. 3 is an end view in section taken on the line 3—3 of Fig. 2. Fig. 4 is a sectional end view of the machine taken on the line 4—4 of Fig. 2, a portion thereof being taken on the line 4^a of Fig. 1. Figs. 5, 7, 9 and 11 are plan views, and Figs. 6, 8, 10 and 12 are corresponding side views, respectively, showing a portion of the folding devices of the machine in successive stages of operation upon the mouth of a paper bag or blank. Figs. 13, 14 and 15 are perspective views of the mouth of a bellows-sided bag blank in successive stages. Fig. 13 shows the blank before it has been folded; Fig. 14 shows an intermediate position of the fold, and Fig. 15 shows the completed funnel folds. Fig. 16 is a front view, in section on the line 16—16 of Fig. 3. Fig. 17 is a sectional view of the suction box taken on the line 17—17 of Fig. 3.

The organization of mechanism shown and described herein is adapted to be attached to many of the well-known forms of paper bag machines, the feed rolls 18 and 19 being considered as equivalents or substitutes for the delivery rolls of such paper bag machines. The mechanism herein shown is driven by a train of gears which may receive their motion from the paper bag machine to which the mechanism may be connected. The feed rolls 18 and 19 are mounted upon the shafts 20 and 21, and are provided with gears 24 and 25 which mesh together. These shafts are supported in the uprights 26 and 27, secured upon a base 28. The feed roll 18 is pressed toward the roll 19 by means of springs 23, pressing against the bearings 22, in which the shaft 20 is journaled. Motion is transmitted by means of the gear 25 to the intermediate gear 29, which runs upon the stud 30, and transmits motion to the gear 31 attached to the shaft 32, running in bearings 33 and 34, attached to the uprights 26 and 27, respectively.

Passing from the feed rolls 18 and 19,

the blanks are delivered to a rotary blank support 35, which is mounted, organized and equipped in a particularly effective and convenient manner, the general arrangement of which is best shown in Fig. 16. The blank support, with its appurtenant frames, carrying the coacting folding gripping and defining mechanism, forms an extended structure, generally tubular in form, extending from the upright 26 to the upright 27, being journaled for rotation close to those uprights, and leaving an extended axial space between the bearings in which is located the actuating devices for driving the coacting mechanism carried by the blank support. At its right hand end the tubular structure is secured to the shaft 32, which therefore imparts the rotary movement to the blank support and its mechanism and other appurtenances. The actuating member for the mechanism consists in the present instance of the cam member 57, which is herein shown to be a single integral piece extending axially within and through the blank support, and is provided with cam paths, either grooved, or open at one side, by means of which the required movements are transmitted to the mechanism in coactive relation to the blank support, as the latter is driven by the shaft 32. For some purposes, or under some circumstances, it may be desirable to make the several cams in separate pieces, in which case they may be joined together longitudinally, and held from turning by means of dowel pins, thus still forming practically an integral structure, and thereby enabling the entire cam structure to be held from rotating from one of its ends. In the present case the rotary structure, carrying the blank support, is driven from the right hand end, while the cam member 57 is held at its left hand end from rotating. This construction of the blank support, its coacting mechanism, and the cams or other actuating devices for said mechanism, enables the rotating parts to be well and firmly supported between widely separated bearings, and the width thus made possible enables the various operating parts to be properly spaced and apportioned, so as to give each mechanism or device ample size and amplitude of movement. This arrangement places the actuating devices for each mechanism close to and generally within the zone of operation of that mechanism, thereby enabling a shorter, more direct, and generally more advantageous driving connection to be made between the mechanisms and their actuating cams or other devices.

The blank support 35 is approximately cylindrical in contour, having portions cut away in its periphery to form the recesses 63 for receiving and operating the folding devices. From its right hand side project the four arms 38, 38 and 39, 39 secured at their outer ends to the spider 42 attached to and driven by the shaft 32. Four arms 40, 40 and 41, 41 extend also from the left hand side of the blank support 35, their outer ends being secured to a spider 43 fitted to rotate on the hub 58 of the fixed cam body 57 secured to the bearing 34.

Between the feed rolls 18 and 19 and the blank support 35 is the receiving plate 17 over which the blanks are fed from the rolls 18 and 19 to the blank support 35. Above this plate is the suction box 45 attached to the bar 46, supported by the uprights 26 and 27. It is the function of this suction box to draw the mouth end of the upper ply of the blank away from the lower ply, thus opening out the side tucks enough to permit the certain entrance therein of the funnel folding blades.

The central portion 49 of the inner wall of the box 45 is curved in approximate conformity to the adjacent cylindrical surface of the blank support 35, sufficient space being left between them for the passage of the blanks. This central portion 49 is of a width approximately equal to the width of the central portion of the blank between the inner edges of the bellows tucks, and it extends over the surface of the blank support far enough to cover the central portion of the blank during the mouth folding operation, thus facilitating the accurate working of the folding devices by helping to retain in position those parts of the blank which are immediately adjacent to the mouth, but whose position is not necessarily altered by the formation of the funnel folds.

The two side portions 48 of the inner wall of the suction box, at each side of the central portion 49 are concaved, and each side is also beveled outwardly from the surface of the blank support so as to give a gradually increasing space for the distention of the bellows sides of the blank, Figs. 1, 4 and 17. These concaved and beveled surfaces 48 are provided with perforations through which the suction operates. Paper bags are usually made with one side wall somewhat longer than the other, to facilitate separating the plies when opening the bag for use. These bags or blanks are preferably delivered to the present mechanism with the shorter wall uppermost, which permits the suction surfaces 48 to act upon the upper ply while the lower ply is still kept in position by the lower unperforated portion 49 of the wall, thus causing the initial separation of the two plies, which separation gradually increases with the forward travel of the blank. The cross section of the suction box 45 shown in Fig. 17 indicates the position of the suction surfaces 48 at the line along which the section is taken. The distended position of the blank also is indi-

cated by dot-and-dash lines in the same figure.

The suction box 45 is connected by means of the pipe 47 with suitable exhausting apparatus, and this pipe may also be provided with valve devices for cutting off connection with the box 45, or for allowing communication therewith at suitable intervals during the passage of the blank through the machine, like the devices shown and described in Patent #591,175 of Oct. 5, 1897.

The rotating blank support 35 carries one or more sets of gripping and folding devices to which suitable movements are imparted as the blank support rotates. The machine herein shown is provided with two sets of these devices, but only one of these sets will be described, it being understood that the construction and mode of operation of the second set is similar thereto, and that these devices alternate in their operation upon the succeeding blanks. Each of the two sets or sections of the blank support 35 is provided with a projecting shelf or ledge 36 having a defining edge 37 which may extend either partially or entirely across the blank support, but should at least be as wide as the depth of the side tucks of the blank. The front gripping device for holding the leading or bottom end of the blank to the support, consists of a gripper 51, mounted in the recess 50 of the blank support, on the pin 52 supported in the blank support 35. It is provided with an arm 53 having a roller or projection which is held by a spring (not shown) against the cam 54 cut on the fixed cam body 57. Adjacent to this edge 37, and on each side of the blank support 35 is arranged a pair of spreaders which revolve with the blank support, and operate in conjunction with the edge 37 to turn over one of the side walls of the blank. In their preferred construction herein shown the blank engaging portion of each of these spreaders comprises a triangular or spear shaped blade 65 having two wings provided with inclined edges 67, which are the principal agents for spreading the plies of the blank and defining the angles of the inner fold line of the primary triangular folds. Hence the angular relation of these edges to their common axis of rotation should be suitable for the formation of those fold lines. When, as in the case shown herein, the axis of rotation is at right angles with the blank the edges 67 should be approximately in axial symmetry about 45 degrees from the axis.

The two wings 65 of the spreader are herein shown to lie in the same plane (Figs. 5 to 12) but this is not an essential condition since the wings may stand at an angle to each other in planes meeting substantially along the line of rotation of the spreader. Moreover, the blades may be formed of wire bent in the contour of the inclined edges 67, or may be otherwise formed in an open construction instead of the solid or blade-like construction shown herein, although the latter form is preferred. The spreaders are mounted upon the slides 59 supported in ways formed in the arms 38 and 39 and 40 and 41 extending from the blank support. The spreader wings 65 are attached to the spreader shells 69 journaled in the slides 59, the axes of the shells being in alinement with each other and with the defining edge 37, while the outer or fold defining edges 67 of the spreader wings are substantially at an angle of 45 degrees with the defining edge 37. Both spreaders are carried into the bellows side tucks of the blank, and are then partially rotated so as to turn the rearward end of the lower wall of the blank around the defining edge 37 inside the rotary path of the blank, and beneath the projecting ledge 36. The motion by which the spreaders are carried into and out of the tucks is given to the slides 59 by the studs 60 which travel in the cam path 61 cut in the fixed cam body 57. The oscillating movement of the spreaders is effected by means of the bevel pinions 70 secured to the shells 69 and meshing with the bevel sectors 71 supported by the hubs 62 on the slides 59 and operated by the cam paths 56 through the arms 72 and the shafts 73, the pinions and sectors being of the type known as "skew bevels," as the axes of motion do not intersect.

Each spreader is provided with a holding and reversing finger 74, pivotally mounted in the lugs 76 of the spreader wings 65 and 66 so as to swing against the under face of the spreader, as shown in Figs. 9 and 10, from a position substantially at a right angle to that face, as shown in the lower part of Fig. 16. It is the function of these fingers to assist in flattening the mouth ends of the bellows sides of the blanks into the triangular plies, and to hold those plies in a flattened condition, during at least a portion of the turning movement of the spreaders. Continuing the funnel folding operation, these fingers serve the further function of reversing the mouth ends of the inner bellows fold lines which when folded in against the spreaders are substantially coincident with the axis of rotation of the spreaders, and central with the triangular plies, and upon which fold lines those triangular plies are subsequently reversely doubled to form the funnel folds. One of the edges of each finger 74 is disposed so as to close into substantial coincidence with the axis of rotation of the spreader, and with the fold lines, thus more positively insuring the doubling of the triangular plies upon themselves along the aforesaid inner bellows fold line.

The hub end of the finger 74 forms a pinion 77 which meshes with the rack 79 formed on the rod 78 which extends through the shell 69. The rod 78 is provided with a head 80, which fits a counterbored recess in the outer end of the short slide 90, and is held in place by the screw plug 81. The short slide 90 is supported in ways formed in the longer slide 59. A reciprocating motion is imparted to it by the cam path 92 through the stud 91, thus causing it to move the rod 78 correspondingly and thereby operate the finger 74. As the center of the actuating rod 78 coincides substantially with the axis of rotation of the spreader 65, the swinging movement of the finger 74 may take place at any time, whether the spreader is rotating or not, the two movements being thus independent. Each set or section of the blank support 35 is also provided with a pair of oppositely disposed retaining fingers 101 which rotate with the blank support and whose function it is to hold to the blank support those portions of the bellows sides of the blank immediately forward of the portions from which the funnel mouth is formed, thus coöperating with the projecting central portion 49 of the suction box in retaining in position that part of the blank not comprised in the funnel mouth. The accurate action of the folding blades is thus rendered more certain and one danger of irregular folding avoided. The fingers 101 are secured to the shafts 102 journaled in the arms 38 and 39 and 40 and 41. Attached to the shafts are the arms 103 held in engagement by the springs 104 with the cam 105, formed on the fixed cam body 57. The fingers 101 are thus swung at the proper intervals toward and from the outer surface of the blank support engaging the upper ply of the blank in lines at an angle of approximately 45 degrees with the defining edge 37. These lines extend outwardly from points just forward of the defining edge and immediately adjacent to either side of the projecting central portion 49 of the suction box.

When the front end of the blank reaches the delivery plate 111, the front gripper 51 is released to permit the blank to pass over the plate to the delivery rolls 112 from which it is carried away from the machine by the tapes 113. At the same time the blank is held to the support by the bifurcated pressing roll 82 fixed to the rotating shaft 83 journaled in spring pressed bearings in the uprights 26 and 27, the shaft 83 being driven by the gear 86 which meshes with the large gear 31.

The consecutive operation of this machine is as follows:—The blank B is delivered to the rolls 18 and 19 in approximately the condition shown in Fig. 13 and passes over the plate 17, being deflected upwardly by the inclined inner end of this plate and thus directed tangentially to the surface of the blank support 35. The leading end of the blank is gripped to the support by means of the gripper 51. When the rear or mouth end of the blank arrives opposite the perforated surfaces 48 of the suction box, the suction through the perforations draws the upper plies of the bellows sides of the blank away from the lower plies, thereby opening the side tucks 96 of the blank and allowing the blades 65 to enter those tucks, the retaining fingers 101 having already closed down upon the blank. The blades 65 are then turned upon their axes which are approximately in alinement with the defining edge 37, thus turning downwardly and forwardly the lower wall of the blank around the edge 37, and thereby stretching open the mouth end of the blank as shown in Figs. 5 to 10 and 14. The fingers 74 are now swung over toward the defining edge 37, as shown in Figs. 9 and 10, against the fold line 99 of the blank. While the fingers 74 remain in this closed position, the blades 65 are turned back to the position shown in Figs. 11 and 12, thereby returning the lower wall of the blank to its first position, as shown in Fig. 15, and doubling the triangular side folds upon themselves upon the fold lines 99 around the edge of the fingers 74, thus reversing the folds upon those lines and leaving them in substantial coincidence and alinement with the axes of the folding blades, and thereby forming on each side of the blank the two V-shaped funnel plies 96. The blades 65 and the fingers 74 are then carried entirely out of the tucks, the fingers 101 are swung away from the blank, and the gripper 51 releases the forward end of the blank just before reaching the plate 111 which plate guides the blank between the rolls 112 while the pressing roll 82 feeds the blank forward and at the same time compresses the funnel folds. The blank thus passes between the delivery rolls 112 and the tapes 113 in approximately the condition shown in Fig. 15, in which, however, the blank is shown to be opened to a slight extent, so as to represent more clearly the character of the funnel folds produced by this operation.

The terms "upper", "lower", "right", "left", "forward", "backward", and similar terms denoting relative positions are herein used in their relative and not their absolute sense, inasmuch as many of the parts may be reversed, inverted or transposed in many ways that will be obvious to the mechanic or designer. The mechanism herein shown and described may also be modified as to dimensions, amplitude of movement and in many other obvious ways to suit different sizes of bags or to suit various conditions of service.

I claim as my invention:—

1. In a paper bag machine, the combination of a rotary blank support, an actuating member extending in axial relation within and through the said blank support, means for rotating the blank support, means for holding the said actuating member against rotation, and coacting mechanism appurtenant to opposite sides of the blank support and engaging with the said actuating member.

2. In a paper bag machine, the combination of a rotary blank support, coacting mechanism mounted on opposite sides of the blank support for movement with and relative to the support, a non-rotating actuating member for the said mechanism extending axially within and through the zone of rotation of the said blank support, and operatively engaging with the said mechanism.

3. In a paper bag machine, the combination of a rotary blank support, coacting mechanism appurtenant to opposite sides of the blank support, means for rotating the blank support from one end, a non-rotating actuating member extending from the opposite end axially within and through the said blank support, and operatively engaging with and driving the said mechanism as the blank support is rotated.

4. In a paper bag machine, the combination of a rotary blank support journaled at its ends for rotation, coactive mechanism appurtenant to opposite sides of the said blank support, a non-rotating actuating member for the said mechanism extending axially within and through the said blank support between the journals thereof and engaging with the said actuating mechanism, whereby the said mechanism is actuated as it rotates with the blank support.

5. In a paper bag machine, the combination of a rotary blank support, coacting mechanism appurtenant to opposite sides of the said support, a cam extending axially through the said blank support and provided with cam paths for actuating the said mechanism, means for rotating the blank support from one end, and means at the opposite end of the cam member for holding it stationary, whereby the said mechanism is actuated as it rotates in engagement with the stationary cam.

6. In a paper bag machine, the combination of a support, frames supporting the blank support between them and mounted for rotation at their opposite ends, coacting mechanism supported for movement in the said frames at opposite sides of the blank support, a cam extending axially within and through the said blank support, provided with cam paths for actuating the said mechanism, means engaging with the frames at one axial end of the combination for rotating the frames and the blank support, and means at the opposite end of the frames for holding the said cam member against rotation whereby the said mechanism is actuated as it rotates with the blank support and in engagement with the said cam paths.

7. The combination, in mechanism for forming the described triangular folds in bellows sided bag blanks, of a rotary cylindrical blank support for supporting the lower ply of the blank, means for holding down the longitudinal center of the upper ply of the blank in approximate conformity with the curvature of the cylinder, suction devices having suction surfaces disposed above the outer margins of the upper ply, and also following the curvature of the cylinder for drawing the said marginal plies away from the lower plies, and means for folding the end of the lower ply away from the said drawn away marginal upper plies to form the said triangular folds therein.

8. The combination, in mechanism for forming the described triangular folds in bellows sided bag blanks, of a rotary cylindrical blank support having a defining edge, suction surfaces disposed above the marginal portions of the upper ply, and provided with a central portion curved in approximate conformity to the blank support for holding down the longitudinal center of the blank to the curved surface of the support, and a pair of spreaders mounted at opposite sides of the blank support to enter the separated side tucks of the blank and fold the lower ply over the defining edge and away from the upper plies to form the said triangular folds therein.

9. A spreader for opening the tucks of bellows-sided bag blanks, mounted for rotation and having blank engaging edges disposed at an angle with each other on opposite sides of the axis of rotation, and a holding finger mounted upon the spreader to hold the central portion of the spread ply of the blank against the side thereof.

10. A tuck spreader, mounted for rotation, and having blank engaging edges disposed at an angle with each other on opposite sides of the axis of rotation, and a holding finger mounted upon the spreader to hold the blank against one side thereof, with an edge of the finger in approximate coincidence with the axis of rotation of the spreader.

11. A tuck spreader, mounted for rotation, and having blank engaging edges disposed at an angle with each other on opposite sides of the axis of rotation, a finger mounted upon the spreader to hold the blank against one side thereof, and means for opening and closing the finger, communicating therewith in a substantially concentric relation to the axis of rotation of the spreader.

12. A tuck spreader, mounted for rotation,

and having blank engaging edges disposed at an angle with each other on opposite sides of the axis of rotation, a finger mounted upon the spreader to hold the blank against one side thereof, and means for operating the finger, comprising a pinion and a rack connected with the pinion, and disposed in axial relation to the spreader.

13. The combination, with a rotary blank support, of a slide appurtenant to the support, rotary folding mechanism carried by said slide, a holding finger carried by said rotary folding mechanism, means for moving the slide to carry the folding mechanism toward and from the blank support, means for rotating the said folding mechanism relative to the slide, and means for operating the finger, including a rack axially mounted relative to the said folding mechanism, and means for moving the axially mounted rack lengthwise as it travels with the slide.

14. In a paper bag machine, the combination of a rotary blank support, a slide mounted for movement toward and from the support, a folding blade mounted for rotation in the said slide, a holding finger mounted for movement on the folding blade to hold the central portion of the said ply against the said blade, and actuating cam members provided with suitable cam paths for actuating the slide, the rotating folding blade, and the holding finger, respectively, and connecting means between said parts and the said cam paths.

15. A tuck spreader, mounted for rotation, and having blank engaging edges disposed at an angle with each other on opposite sides of the axis of rotation, a finger mounted upon the spreader to hold the blank against one side thereof, means for operating the finger, comprising a pinion, and a rack connected with the pinion, and disposed in axial relation to the spreader, means for rotating the spreader, and means for operating the rack.

16. The combination, in mechanism for opening the tucks of bag blanks, of a blank support having a defining edge, a spreader mounted for rotation on an axis substantially in alinement with the said defining edge, and provided with wings, the outer edges of which are inclined at substantially equal angles with the axis, on lines which intersect substantially at said axis, and a finger pivotally mounted upon the spreader for holding the approximately central portion of the spread ply against the spreader.

17. The combination, in mechanism for opening the tucks of bag blanks, of a blank support having a defining edge, a spreader mounted for rotation on an axis substantially in alinement with the said defining edge, and provided with wings the outer edges of which are inclined at substantially equal angles with the axis along lines which intersect substantially in the line of said axis, a finger pivotally mounted on the spreader for holding the blank against the spreader, one edge of the finger when closed being in approximate coincidence with the axis of rotation of the spreader.

18. The combination, in mechanism for forming the described triangular folds in the tucked sides of paper bag blanks, of a blank support having a defining edge, a spreader mounted for rotation on an axis substantially in alinement with said defining edge and provided with wings having blank engaging edges substantially defining the lines of the two inner sides of the said triangular folds, and a finger pivotally mounted upon the spreader to swing against the blank approximately at the central transverse fold line of the said triangular folds.

19. The combination, in mechanism for forming the described funnel folds in bellows-sided bag blanks, of a traveling blank support having a defining edge, a suction box adjacent thereto provided with a central portion for holding down the center of the blank, and with oppositely disposed suction surfaces inclined away from the surface of the blank support for drawing the upper ply of the blank away from the lower ply, a pair of spreaders mounted to enter the side tucks of the blank, means for turning the spreaders to fold the lower ply over the defining edge to form flattened triangular folds and then fold it back again, and means carried by the spreaders for reversing the folds along the center line.

20. The combination, in mechanism for forming the described funnel folds in bellows-sided bag blanks, of a traveling blank support having a defining edge, a suction box adjacent thereto, provided with a central portion for holding down the center of the blank, and with oppositely disposed suction surfaces inclined away from the surface of the blank support for drawing the upper ply of the blank away from the lower ply, a pair of spreaders mounted to enter the side tucks of the blank, means for turning the spreaders to fold the lower ply over the defining edge to form flattened triangular folds and then fold it back again, and a pair of reversing fingers carried by the spreaders and mounted to swing against the center line of the said triangular folds and reverse the folds along that line.

21. The combination, in mechanism for forming the described triangular folds in the bellows sides of paper bag blanks, of a blank support, means for opening the side tucks and forming the triangular folds therein, and a pair of retaining fingers mounted to travel with the blank support and close against the blank over the bellows sides

thereof, and adjacent to the inclined edges of the said triangular folds.

22. The combination, in mechanism for forming the described triangular folds in the bellows sides of paper bag blanks, of a blank support having a defining edge, a pair of spreaders mounted for rotation on an axis substantially in alinement with said defining edge, and provided with wings having inclined blank engaging edges substantially defining the lines of the two inner sides of the said triangular folds, and a pair of retaining fingers mounted to travel with the blank support and close against the blank over the bellows sides thereof, and adjacent to the inclined edges of the said wings.

23. The combination, in mechanism for forming the described triangular folds in the bellows-sides of paper bag blanks, of a blank support having a defining edge, a pair of spreaders mounted for rotation on an axis substantially in alinement with said defining edge, and provided with wings having inclined blank engaging edges substantially defining the inclined edges of the said triangular folds, holding fingers pivotally mounted upon the spreaders to swing against the blank approximately along the central transverse line of the said transverse folds, and a pair of retaining fingers traveling with the blank support to close against the blank over the bellows-sides thereof, and adjacent to the inclined edges of the said triangular folds.

24. The combination, in mechanism for forming the described funnel folds in bellows-sided bag blanks, of a traveling blank support having a defining edge, a suction box adjacent thereto, provided with a central portion for holding down the center of the blank, and with oppositely disposed suction surfaces inclined away from the surface of the blank support for drawing the upper ply of the blank away from the lower ply, a pair of spreaders mounted to enter the side tucks of the blank and fold the lower ply over the defining edge to form flattened triangular folds, and then fold it back again, holding fingers carried by the respective spreaders and mounted to swing against the center line of said triangular folds, and reverse the folds along that line, and a pair of retaining fingers traveling with the blank support to close against the blank over the bellows sides thereof, and adjacent to the inclined edges of the said triangular folds.

25. In a paper bag machine, the combination of a rotary blank support, a pair of retaining fingers mounted upon opposite sides of the blank support for oscillation over and upon the surface of the support, the said fingers extending across the surface of the support at acute angles to the direction of travel of the support, and at acute angles to their axes of oscillation.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses this 8th day of July, 1907.

JOSEPH MERRITT.

Witnesses:
CAROLINE M. BRECKLE,
NELLIE PHOENIX.

Copies of this patent may be obtained for five cents each, by addressing the "Commissioner of Patents. Washington, D. C."