

W. A. LORENZ.
PAPER BAG MACHINE.
APPLICATION FILED NOV. 9, 1903.

1,029,700.

Patented June 18, 1912.

5 SHEETS—SHEET 1.

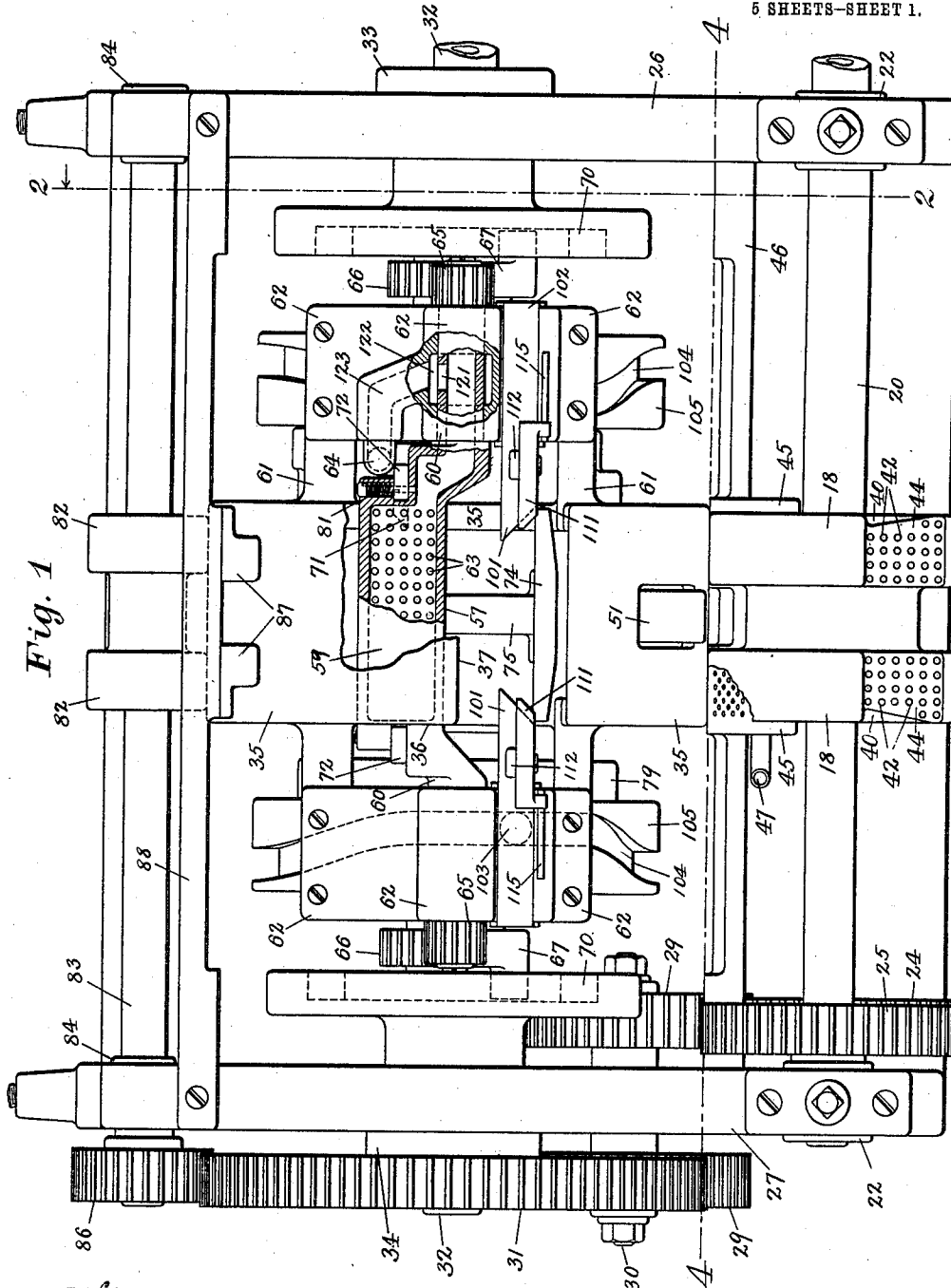


Fig. 1

Witnesses:

H. Mallner
Jas. M. Green

Inventor

William A. Lorenz

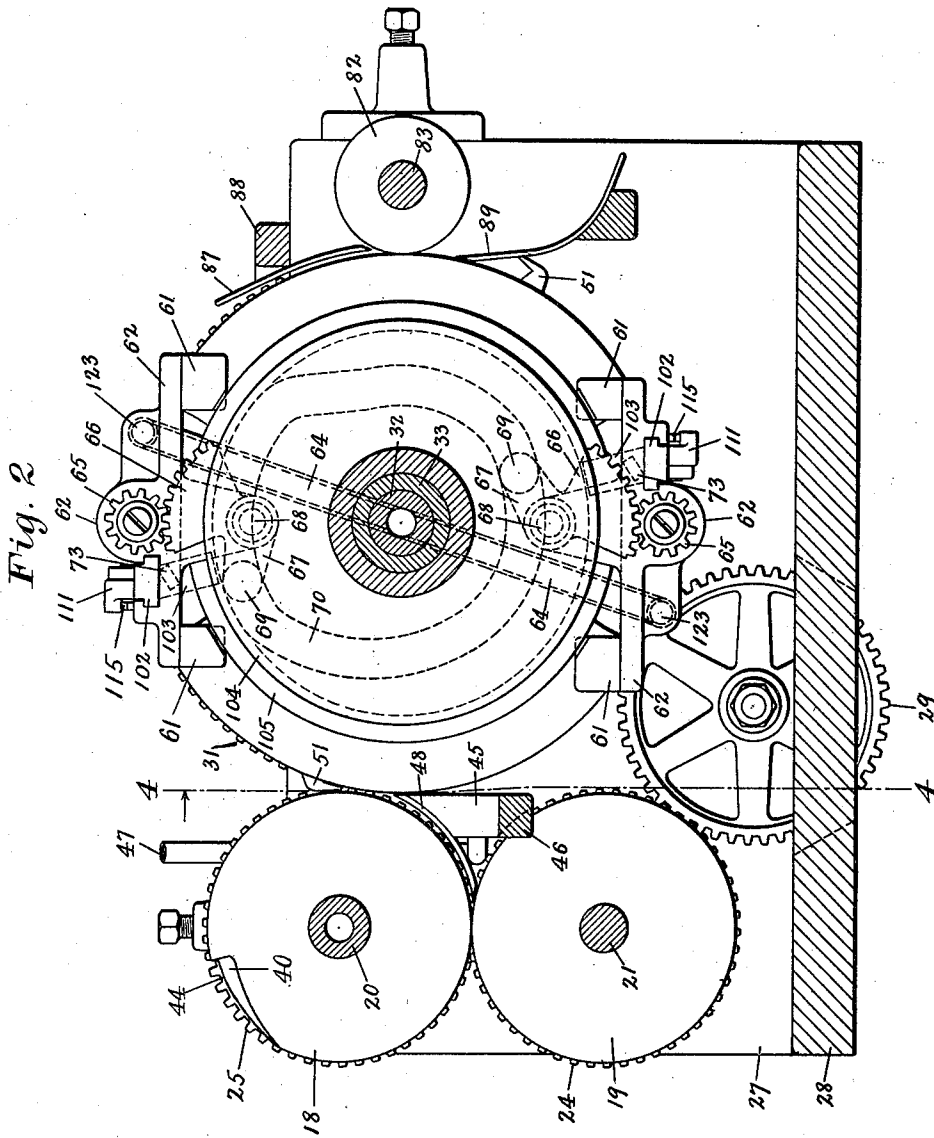
By W. A. Honiss, Atty.

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Witnesses:
H. Mallner
Jas. N. Green

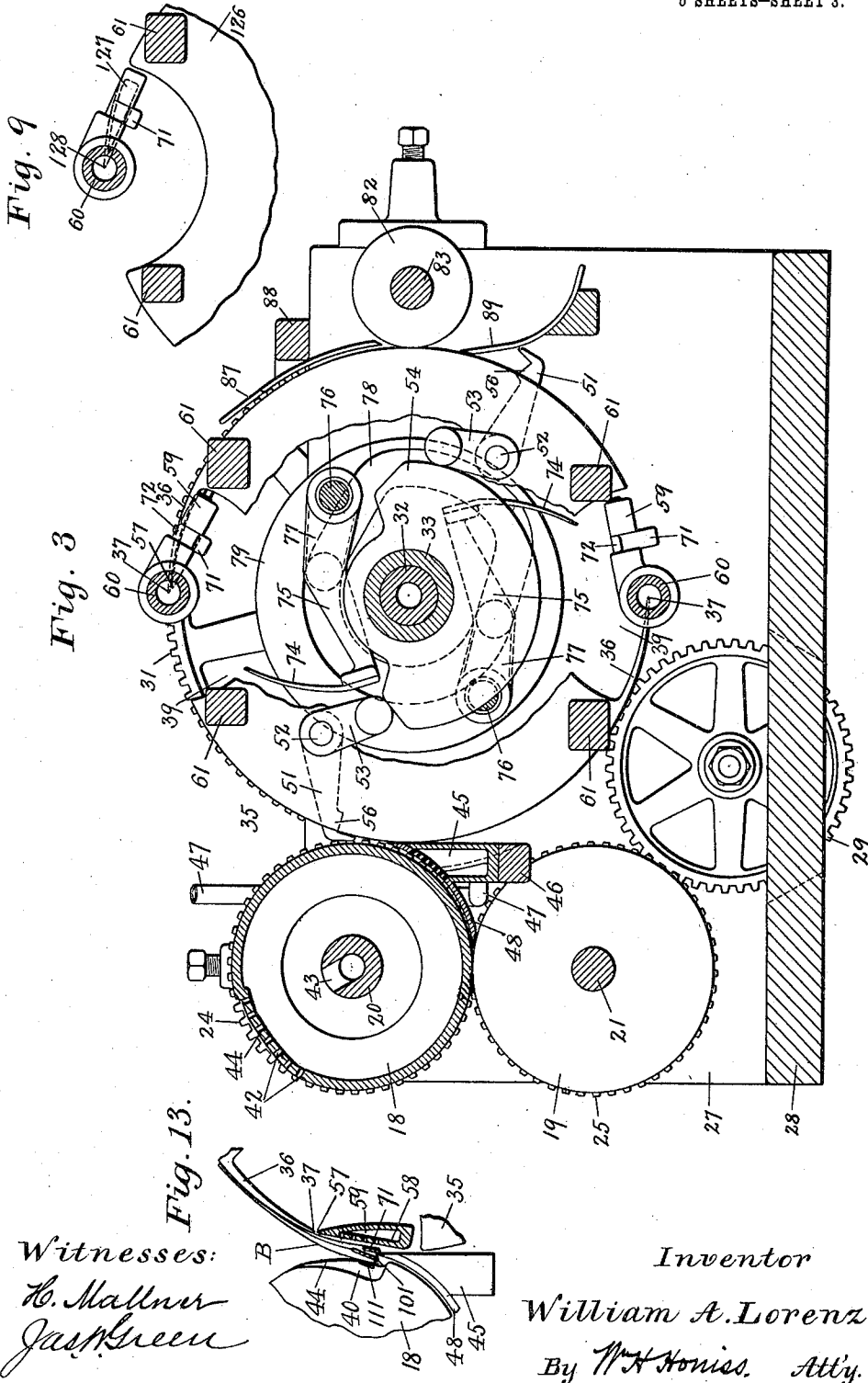
Inventor
William A. Lorenz
By *Wm. A. Honiss* Atty.

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5 SHEETS—SHEET 3.

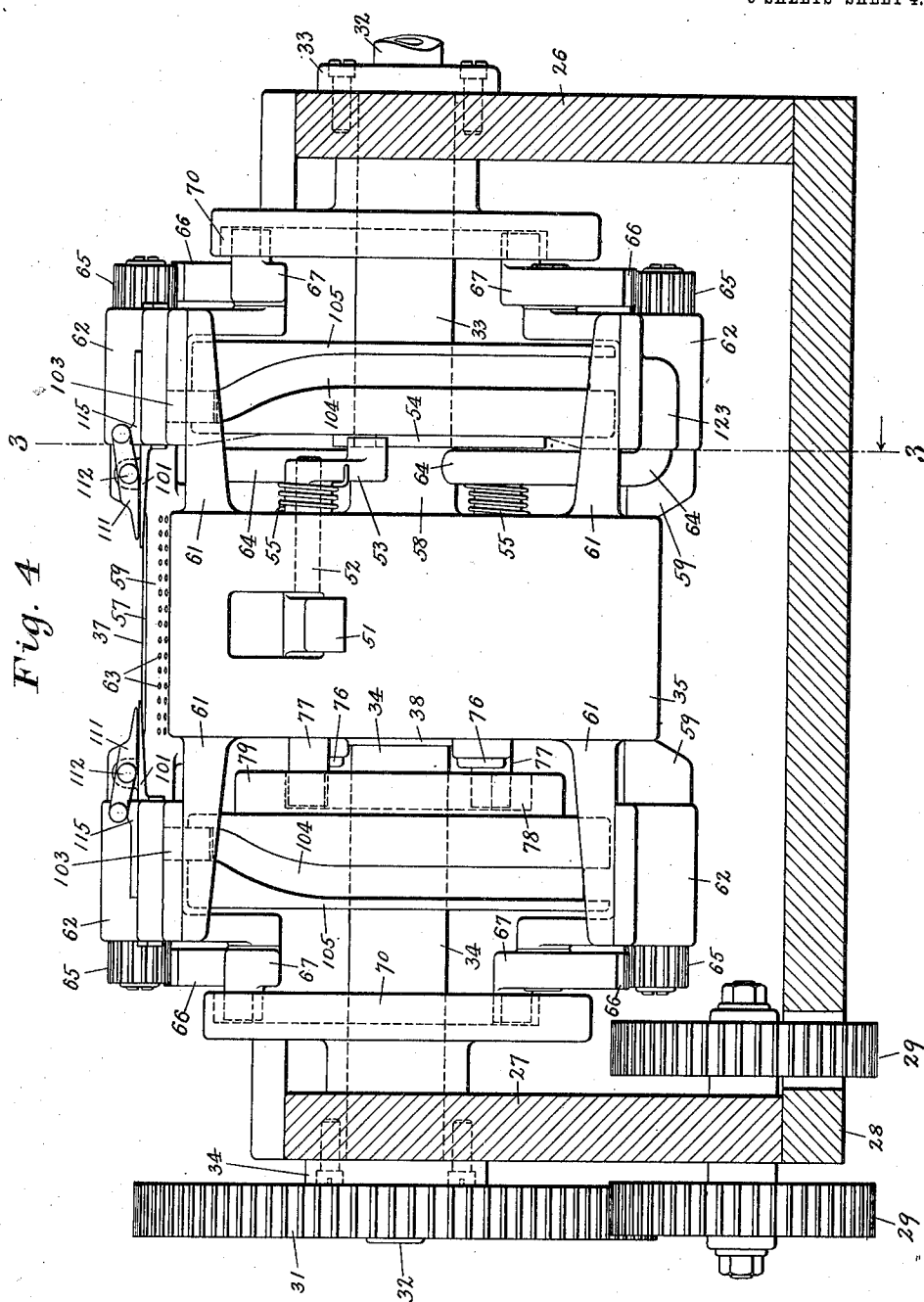


Witnesses:
H. Mallner
Jack Green

Inventor
William A. Lorenz
By *W. A. Honies* Atty.

1,029,700.

5 SHEETS—SHEET 4.



Inventor

William A. Lorenz
By *W. A. Honiss*. Att'y.

W. A. LORENZ.

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5 SHEETS—SHEET 5.

Fig. 5

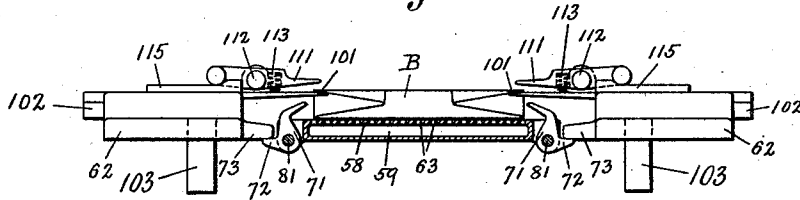


Fig. 6

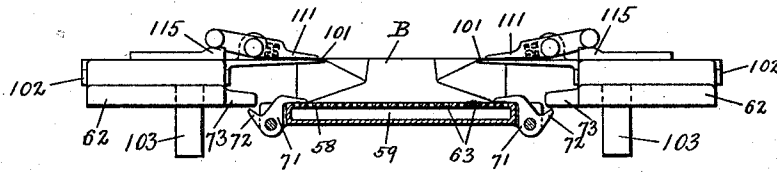


Fig. 7

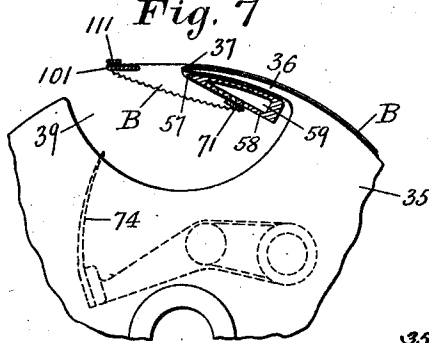


Fig. 8

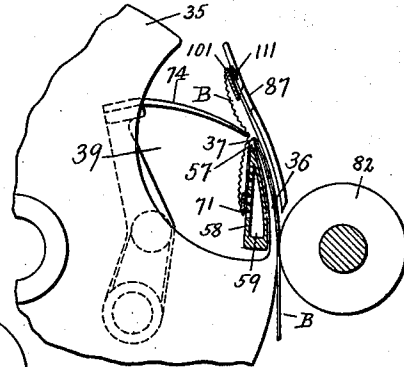


Fig. 14.

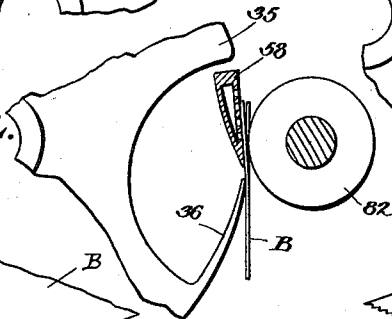


Fig. 11

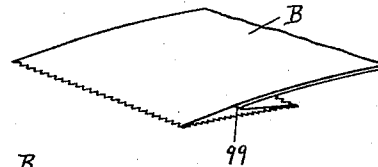


Fig. 12

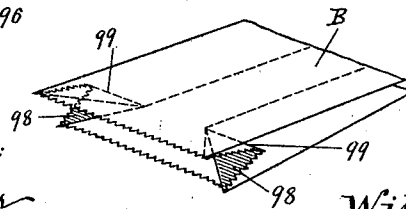
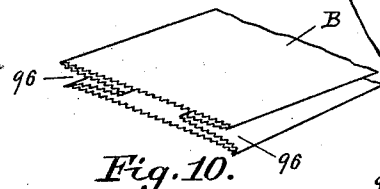


Fig. 10.



Witnesses:

H. Mallin
Jas. Green

Inventor

William A. Lorenz

By W. H. Honiss, Atty.

UNITED STATES PATENT OFFICE.

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

PAPER-BAG MACHINE.

1,029,700.

Specification of Letters Patent.

Patented June 18, 1912.

Application filed November 9, 1903. Serial No. 180,326.

To all whom it may concern:

Be it known that I, WILLIAM A. LORENZ, 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 will turn outwardly instead of inwardly, and thus present a funnel-shaped mouth for the more ready reception of the contents of 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 turned outwardly, the innermost bellows fold line being reversed and 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 blade, herein designated as the reversing blade, is brought against the blank, across the centers of the triangular plies, into approximate coincidence with that were formerly the inner bellows fold lines, upon which lines each of these triangles is then doubled upon itself by the turning back of the doubled over side wall, the reversing blade serving to prevent the said fold line from returning to its original position.

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; or both operations may be performed simultaneously.

Figure 1 of the drawings is a plan view of a machine embodying my present invention. Fig. 2 is an end view of the machine taken in section on the line 2—2 of Fig. 1. Fig. 3 is an end view taken in section on the line 3—3 of Fig. 4. Fig. 4 is a side view in section on the line 4—4 of Fig. 1. Figs. 5 and 6 are side views, and Figs. 7 and 8 are end views of parts of the folding mechanism, showing different stages of the folding operation. Fig. 9 is an end view of a modified form of part of the folding devices. Figs. 10, 11 and 12 are perspective views of the mouth of a bellows-sided bag blank in successive stages. Fig. 10 shows the blank before it has been folded; Fig. 11 shows an intermediate position of the fold; and Fig. 12 shows the completed funnel folds. Fig. 13 is a fragmentary side view, showing the position of the parts while distending the mouth end of the bag or blank. Fig. 14 is an end view showing the folding mechanism at the end of its return movement.

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 gear 25 by meshing that gear with a gear on the paper bag machine to which it is connected. The feed rolls 18 and 19 are mounted upon the shafts 20 and 21, journaled in bearings 22—22, and are provided with gears 24 and 25 which mesh together. These shafts and bearings 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 not shown, pressing against the bearings 22. Motion is transmitted by means of the gear 24 to the intermediate gears 29, on the shaft 30, and thence to the gear 31 attached to the shaft 32, running in

bearings 33 and 34, attached to the uprights 26 and 27, respectively. The blank support 35 is mounted on the shaft 32, and is approximately cylindrical, having portions cut away to form recesses 39 in its periphery, to allow room for the operation of the fold-forming devices.

The upper feed roll 18 is bifurcated and made hollow to form a suction roll. It is provided on one portion of its periphery, which is preferably recessed as shown, with perforations 42 communicating with its interior, and connection with suitable exhausting apparatus is made by means of the holes 43 and the hollow shaft 20.

Between the feed rolls 18 and 19 and the blank support 35 is the suction box 45, which communicates by means of the pipe 47 with the main suction pipe. The wall 48 of this box inclines upward toward the surface of the blank support 35 and is provided with perforations communicating with the interior of the box. This box is also provided with a recess to allow of the passage of the grippers 51. The main exhaust pipe may be provided with gates for cutting off connection with the box 45, and the roll 18, or for allowing communication therewith at suitable intervals of the passage of the blank through the machine, like the devices shown and described in my Patent #591,175. The suction box 45 and the roll 18 serve to draw apart the mouth ends of the two side walls of the blank to permit the certain entrance of the sustaining and folding devices into the side tucks of the blank. For this purpose the mechanism is so adjusted that the sustaining blades 101 with their pincers 111 begin to move into the side tucks just before the recess 44 of the roll 18 has passed entirely clear of the suction box 45 as shown in Fig. 13. The separation of the two plies also enables the folding pincers 71 to close down properly over the lower ply, the roll 18 being beveled off at 40 on each side to clear the pincers 111 as they close down on the blank.

The rotating blank support or carrier 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 I will describe but one of these sets, 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 successive blanks.

The front gripping device consists of a gripper 51 attached to a shaft 52 provided with a roller or projection 53 which is held by the spring 55 against the fixed cam 54, attached to the bearing 33. Under some circumstances, particularly where the blanks or bags are delivered to this machine after

passing through another machine, as in the case where this machine receives the bags from a bag-making machine, there is liable to be some variation in the delivery of the blanks or bags to the surface of the blank support. To avoid irregular registration, from this or any other cause, the gripper 51 is utilized as a registering member, being provided with a registering surface 56, which is so located that in the closed position of the gripper it occupies the correct position for the front end of the blank. Thus any blanks which reach the support in advance of their correct position will be pushed back by the surface 56 a sufficient amount to cause them to register correctly. In adjusting the blank support to the feeding mechanism, it is only necessary to make sure that the front ends of the tardiest of the blanks will be delivered to the correct position, as all others will be pushed back to proper register by the surface 56 when the gripper closes. It is preferable to adjust the parts so that all the blanks will be delivered to the blank support a little in advance of correct registry, so that all will be pushed back to a greater or less extent. The parts should be so proportioned and disposed as to leave sufficient space between the blade 48 and the roll 18 to allow the blank to bend or buckle backwardly from the registering surface 56 to a sufficient extent to cover the widest variations in delivery that may occur.

In each of the recesses 39 of the blank support is arranged a set of funnel folding devices which revolve with the blank support and operate to turn over one of the side walls of the blank, comprising the swinging suction box 59 and the sustaining blades 101. The latter are attached on opposite sides of the blank support 35 to the slides 102, which are supported on the brackets 62, secured to the arms 61, extending from the blank support, the outer or fold defining edges of the blades 101 being inclined substantially at an angle of 45 degrees with the transverse fold line 99 of the blank. Both blades 101 are carried into and out of the bellows-side tucks of the blank by the movement imparted to the slides 102 by the fixed cams 105, which are attached to the bearings 33 and 34, and engage with the projections 103 of the slides by means of the grooves 104. The blades 101 are preferably provided with pincers 111 pivoted on the studs 112, and operated by the cams 115 appurtenant to the bracket 62, the outer ends of the pincers 111 being held to the cam surfaces by the springs 113 as the slides move toward and away from the blank. The blades 101 sustain the upper plies of the bellows side tucks of the blank while the swinging suction box 59 is turning over the rearward end of the lower wall of the blank upon the fold line 99.

The swinging suction box 59 is journaled

by means of the trunnions 60 in the brackets 62, the axes of the trunnions being approximately in alinement with the defining edge 57, formed by the meeting of the outer surfaces of the upper and lower walls of the suction box, and substantially coincident with the circle of rotation of the supporting surface of the blank support. This defining edge 57 serves to locate and define the transverse line 99 of the blank over which the lower ply thereof is folded to the form shown in Fig. 11. Each of the blank holding sections of the blank support may also be provided with a projecting ledge 36 extending to or toward the defining edge 57 of the suction box. This ledge when employed serves to support the corresponding portion of the blank, and when it extends to the defining edge 57 of the suction box its edge 37 supplements the action of the suction box in defining the fold line 99 of the blank, but this ledge may be dispensed with, as shown by the modified form of blank support 126 in Fig. 9, in which case the defining of the transverse fold line 99 is performed entirely by the defining edge 128 of the suction box 127. In this modification also the upper wall of the suction box is preferably curved in an arc substantially coinciding with the circle of the blank support 126, so as to take the place of the projecting ledge 36 of the blank support 35 in supporting the blank while the suction box is in the position shown in Fig. 9. The oscillating movement is effected by means of the pinions 65, which are fixed upon the trunnions 60 and mesh with the sector gears 66 pivotally mounted on studs 68 attached to the brackets 62. These sectors are provided with arms 67 having rolls or studs 69 running in the grooves in the cams 70 fixed to the bearings 33 and 34. The wall 58 of the suction box 59 is provided with perforations 63 communicating with its interior, and connection with the exhausting apparatus is made through one of the trunnions 60, which is hollow. An opening 121 (Fig. 1) in the hollow trunnion connects through the chamber 122 and the channel 123 in the base 62 with the pipe 64, which leads through the hub 38 of the blank support into the shaft 32, which is made hollow and communicates at one end with the main suction pipe, not shown.

The suction box 59 is preferably provided with a pair of oppositely disposed pincers 71, pivotally supported by the box 59, and having projections 72, which engage with the lugs 73 on the brackets 62 (Fig. 6) when the suction box 59 is swung in position to receive the blank. Springs 81 serve to close the pincers on the blank as soon as the movement of the box 59 carries the projections 72 of the pincers away from the lugs 73 as shown in Figs. 5 and 6.

Each set or section of the blank support

is also provided with a reversing blade 74 mounted on an arm 75, which is pivoted on a stud 76, appurtenant to the blank support 35. The arm 75 is also provided with a roll or stud 77, engaging with the groove 78 on the cam 79 secured to the bearing 34. The defining edge of the blade 74 is parallel with the defining edge 57 of the suction box and is mounted to move toward and from that defining edge during the rotation of the blank support, cooperating with the suction box 59 and the blades 101 to form the funnel mouth folds.

Just before the forward end of the blank reaches the plate 89 the front gripper is released to permit the blank to be delivered from the blank support, the plate 87 supported by the bar 88 serving to flatten down the completed folds of the blank. At the same time the blank is held to the support by means of the bifurcated pressing roll 82 fixed to the rotating shaft 83 mounted in bearings in the uprights 26 and 27, the bearings being pressed toward the blank support 35 by springs (not shown). Rotary motion is imparted to the roll 82 by the gear 86 (Fig. 1) meshing into the large gear 31. The completed blank then passes over the plate 89 and is carried away from the machine by any suitable means.

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. 10, and passes over the suction box 45, being deflected upwardly by the inclined wall 48 of the box, and thus directly tangentially to the surface of the blank support 35. The front end of the blank is gripped to the blank support by means of the gripper 51. When the rear or mouth end of the blank arrives between the suction box 45 and the roll 18 the suction through the perforations draws the upper and lower walls of the blank apart, thereby opening the tucks 96 of the blank. The blades 101 then enter those tucks, sustaining the upper plies of the bellows sides of the blank while the pincers 111 close down upon its upper surface. The swinging suction box 59 to which the lower ply of the blank strongly adheres on account of the pressure over the perforations, is then turned by its trunnions, the axes of which are approximately in alinement with the defining edge 37, thus turning downwardly and forwardly the lower wall of the blank around the defining edge 57, thereby stretching open the mouth end of the blank, as shown in Figs. 5, 6, 7 and 8, the pincers 71 closing down on the upper side of the lower bellows tuck during the beginning of the swinging movement. Then the blade 74 is swung forward to the defining edge 37 as shown in Fig. 8 against the fold line 99 of the blank. While the blade 74 remains in

this position, the swinging suction box 59 is turned back toward the blade 74, thereby returning the lower wall of the blank to its first position as shown in Fig. 12, and doubling the triangular side folds upon themselves upon the fold line 99 around the edge of the blade 74, thus reversing the folds upon that line and leaving it in substantial coincidence and alinement with the axis of the swinging suction box, and thereby forming on each side of the blank the two V-shaped funnel plies 98. The pincers 111 and 71 are then released from the blank and the blades 101 carried entirely out of the trucks; and as the mouth end of the blank approaches the plate 87 the funnel defining blade 74 is gradually retracted, and the funnel folds are flattened by passing under the plate 87. Just before reaching the blade 89 the gripper 51 releases the forward end of the blank, and the pressing rolls 82 feed it forward over the plate 89 which guides it between delivery rolls or to any other mechanism suitable for carrying it away from the machine, thus finally compressing it to approximately the condition shown in Fig. 12, in which, however, the blank is 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. The combination in devices for forming the described triangular folds in the mouth ends of bellows-sided bag blanks of a rotary blank support, suction devices for separating the ends of the opposite side walls, gripping means for sustaining the upper side wall of the blank substantially at the rotary path of the blank support, a suction device provided with a defining edge and mounted to swing upon an axis substantially in line with the said defining edge, and means for swinging the said suction device upon its axis to fold back the lower side wall of the blank inside of the rotary path of the blank support.
2. The combination in devices for forming the described triangular folds in the mouth end of bellows-sided bag blanks of a rotary blank support, gripping means carried by the blank support for sustaining the end of the upper side wall of the blank substan-

tially in coincidence with the rotary path of the blank support, a suction box carried with the blank support provided with a cross-fold defining edge, and mounted to swing upon an axis substantially in line with the said defining edge and adjacent to the rotary path of the blank support, and means for oscillating the said suction box upon its axis to fold the lower wall of the blank downwardly and forwardly inside of the rotary path of the blank support to form the triangular folds therein.

3. The combination in devices for forming the described triangular folds in the mouth ends of bellows-sided bag blanks, of a traveling blank support, gripping means carried by the support for sustaining the upper side wall of the blank, a defining edge carried by the blank support, a suction box carried in the support for holding the lower side wall, mounted to swing upon an axis substantially coincident with the said defining edge, and means for oscillating the said suction box upon its axis to fold back the lower ply and form the described triangular folds.

4. The combination in devices for forming the described funnel folds in the mouth ends of bellows-sided bag blanks of a rotary blank support, gripping means carried thereon for sustaining the upper side wall of the blank in substantial coincidence with the rotary path of the blank support, a suction box carried by the support provided with pincers for holding the lower side wall and with a transverse fold defining edge and mounted to swing upon the axis substantially in line with the said defining edge and adjacent to the rotary path of the blank, means for oscillating the said suction box upon its axis to fold the lower side wall of the blank inwardly away from the said rotary path of the blank support to form triangular folds therein and then unfold the said side wall back to its first position of substantial coincidence with the rotary path of the blank support, and a cooperating reversing blade for doubling the said triangular folds upon themselves.

5. The combination in devices for forming the described funnel folds in the mouth ends of bellows-sided bag blanks, of a traveling blank support, means carried on the support for gripping the upper side wall of the blank, a defining edge carried by the blank support, a suction box carried on the support for holding the lower side wall, mounted to swing upon an axis substantially coincident with the said defining edge, means for oscillating the said suction box upon its axis to fold back the lower side wall into flat triangular folds, and then unfold the said side wall back to its first position, and a cooperating reversing blade for doubling the said triangular folds upon themselves.

6. The combination in devices for forming

the described funnel folds in the mouth ends of bellows-sided bag blanks, comprising a traveling blank support, a pair of gripping devices for gripping and sustaining the upper plies of the blank, a defining edge carried by the support, a suction device for holding the lower ply of the blank, mounted for swinging movement upon an axis carried by the blank support and located substantially in coincidence with the said defining edge, grippers for holding the side edges of the lower ply to the suction device, means for moving the said gripping devices laterally into and out of engaging relation with the blank, and means for oscillating the swinging suction device upon its axis to fold over the lower ply and then to unfold it again for the purpose specified.

7. The combination in devices for forming the described funnel folds in the mouth ends of bellows-sided bag blanks, comprising a traveling blank support, a pair of oppositely disposed grippers for gripping the upper bellows plies of the blank, a defining edge carried by the blank support, a suction device for holding the lower bellows ply, mounted for swinging movement upon an axis carried by the blank support and located substantially in coincidence with the said defining edge, grippers carried by the suction device for holding the side edges of

the plies thereon, means for oscillating the swinging suction device upon its axis to fold and then to unfold the lower ply, and a reversing blade for cooperating in doubling the flat triangular folds formed by the swinging movement of the suction device.

8. The combination with a rotary blank support of a gripper device for the upper ply comprising a blade and a cooperating pincer therefor situated adjacent to the rotary path of the blank support, a gripper device for the lower ply of the blank comprising a suction member and a cooperating pincer mounted for swinging movement inside the rotary path of the blank support upon an axis adjacent to that path, means for swinging the suction device to fold the end of the lower wall of the blank inwardly from the said rotary path and back again to its first position, and an abutment for opening the pincer of the suction device at the said first or resting position of the suction device.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

WILLIAM A. LORENZ.

Witnesses:

JAS. W. GREEN,
H. MALLNER.