

No. 863,731.

PATENTED AUG. 20, 1907.

W. A. LORENZ.
PAPER BAG MACHINE.
APPLICATION FILED AUG. 8, 1903.

3 SHEETS—SHEET 1.

Fig. 1

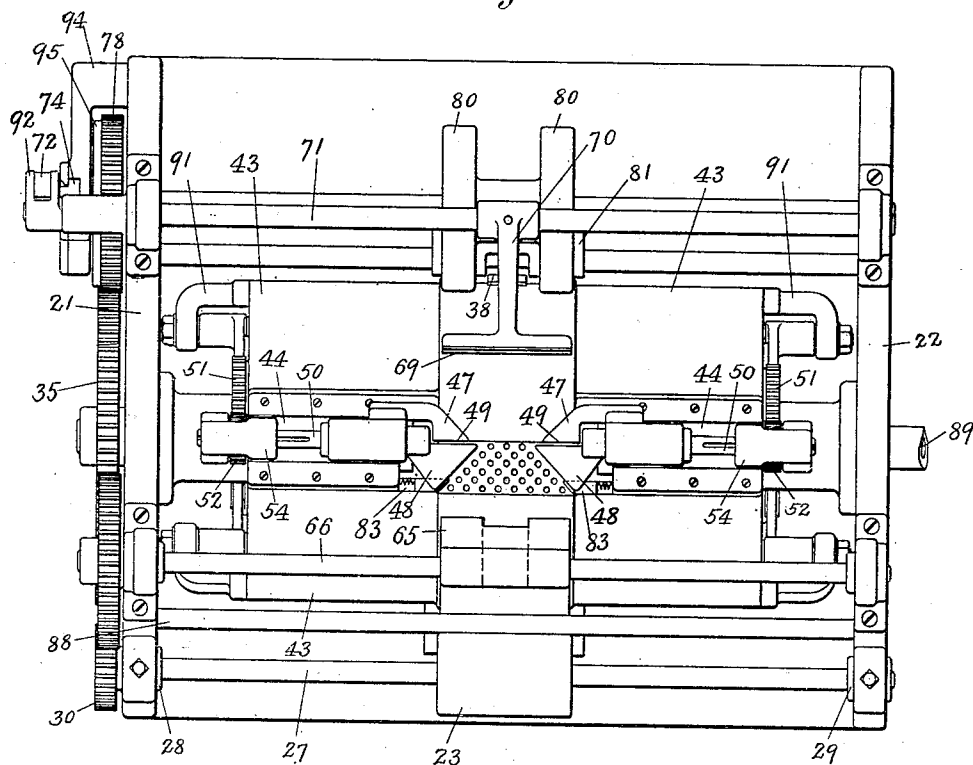


Fig. 8

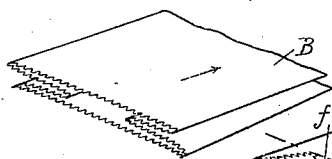


Fig. 10

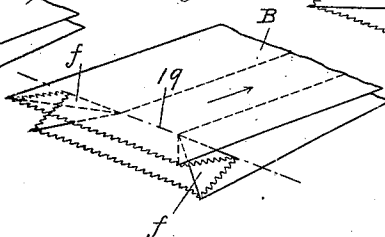
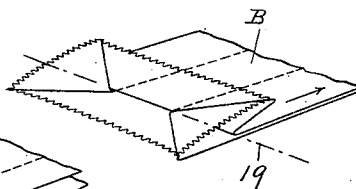


Fig. 9



Witnesses:

H. Mallner
Jas. Green

Inventor

William A. Lorenz

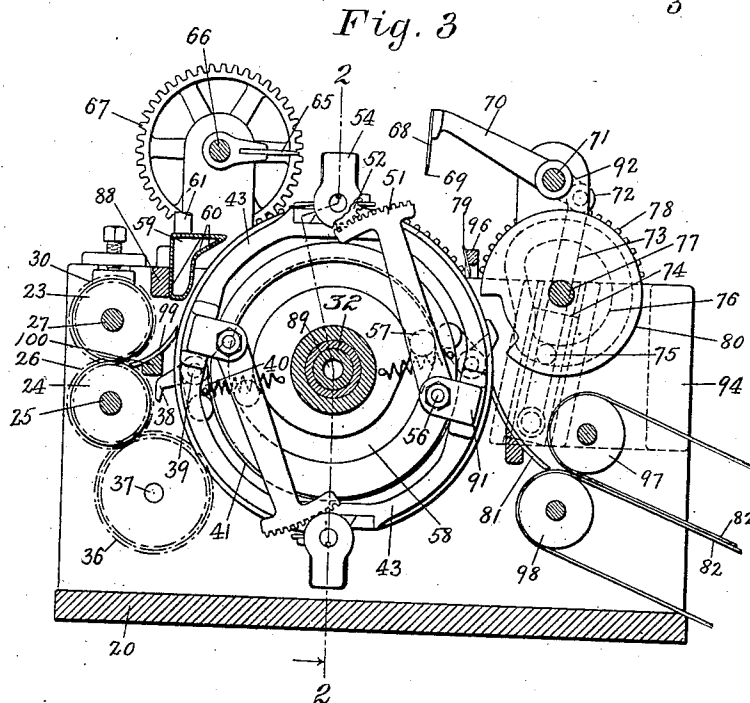
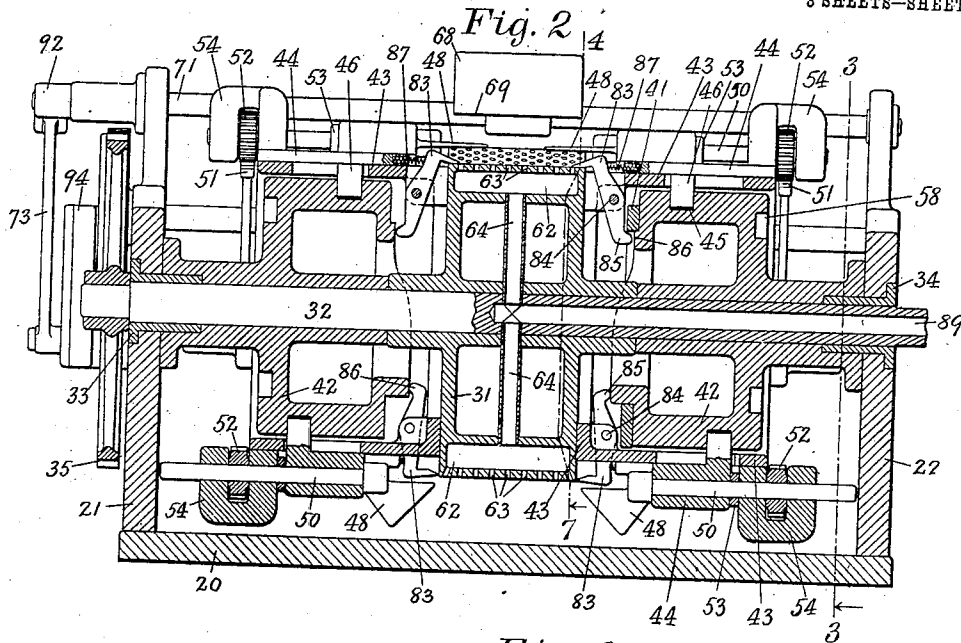
By W. A. Huns. Atty.

No. 863,731.

PATENTED AUG. 20, 1907.

W. A. LORENZ.
PAPER BAG MACHINE.
APPLICATION FILED AUG. 8, 1903.

3 SHEETS—SHEET 2.



Witnesses:

H. Mallin
Jas. Green

Inventor.

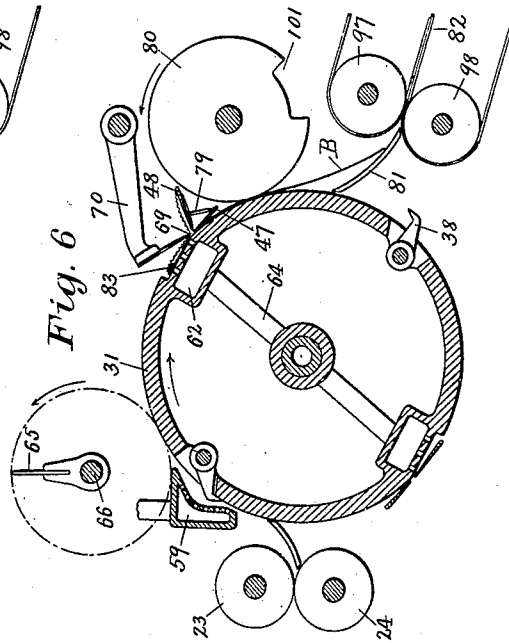
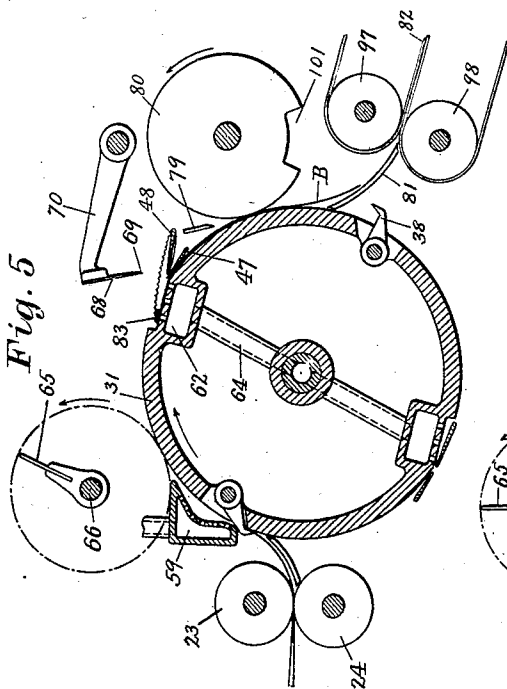
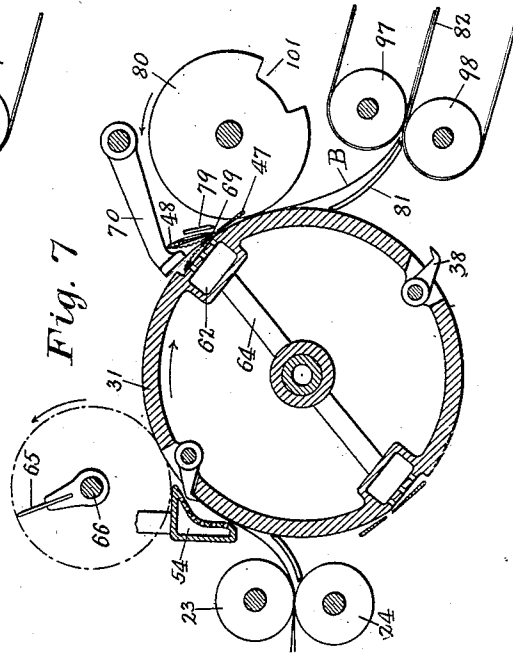
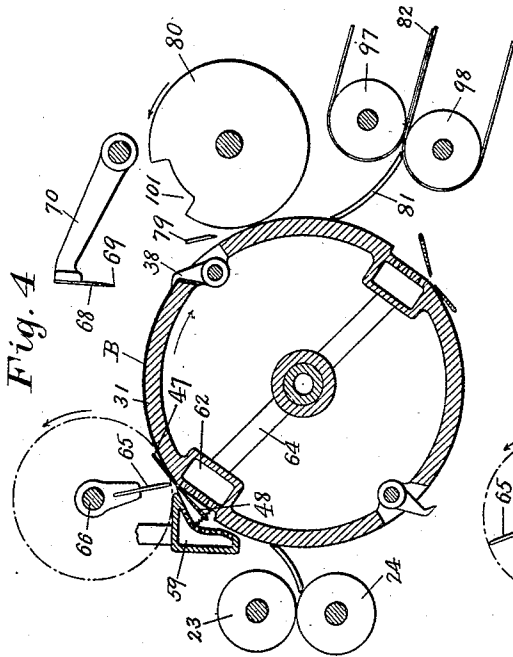
William A. Lorenz
By *W. A. Norris* Atty.

No. 863,731.

PATENTED AUG. 20, 1907.

W. A. LORENZ.
PAPER BAG MACHINE.
APPLICATION FILED AUG. 8, 1903.

3 SHEETS—SHEET 3.



Witnesses:
H. Mallon
Jas. Green

Inventor
William A. Lorenz
By W. A. 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.

No. 863,731.

Specification of Letters Patent.

Patented Aug. 20, 1907.

Application filed August 8, 1903. Serial No. 168,742.

To all whom it may concern:

Be it known that I, WILLIAM A. LORENZ, a citizen of the United States, and a 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 funnel defining blade, is brought against the blank, across the centers of the triangular plies, into approximate coincidence with what 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 funnel defining 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, in section taken on the line 2, 2 of Fig. 3. Fig. 3 is a side view, taken on the line 3, 3 of Fig. 2. Figs. 4, 5, 6 and 7 are side views, in section taken on the line 4, 7 of Fig. 2, 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. 8, 9 and 10 are perspective views of the mouth of a bellows-sided bag blank in successive stages. Fig. 8 shows the blank before it has been folded; Fig. 9 shows the primary triangular folds, and Fig. 10 shows the completed funnel folds.

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 23 and 24 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 26 by meshing that gear with a suitable gear on the paper bag machine to which it is connected.

The feed rolls 23 and 24 are mounted upon shafts 27 and 25, provided with gears 26 and 30 which mesh together. The shafts are supported in the frames 21 and 22, secured upon the base 20, the journals of the lower shaft being formed integral with the frames 21 and 22, while the upper shaft is journaled in spring pressed bearings 28 and 29 which press the roll 23 towards the roll 24. Motion is transmitted by means of the gear 26 to the intermediate gear 36 which turns upon the stud 37 and transmits motion to the gear 35 fixed on the shaft 32, which turns in bearings 33 and 34 attached to the uprights 21 and 22, respectively. The blank support 31 is carried on the shaft 32, and is approximately cylindrical. The receiving plate 99 is attached to the bar 100, supported by the uprights 21 and 22.

Disposed a little above the feed roll 23 and near the surface of the blank support 31 is a suction box 59 attached to the bar 88 supported by the uprights 21 and 22. This box communicates by means of the pipe 61 with suitable exhausting and controlling apparatus, not here shown, (such for example as is shown in my Letters Patent #591,175 Oct. 5, 1897), and the wall of the box nearest the blank support is provided with holes 60 communicating with the interior of the box. The rotating blank support 31 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, only one of which will be described herein, 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. The gripping device consists of a gripper 38 attached to a shaft 39 provided with an

arm 40 which is held by means of a spring against the stationary cam 41 fixed to, or integral with the cam 42, appurtenant to the upright 22. The function of this gripper is to hold the leading end of the blank to the

5 blank support.

The mouth end of the lower side or ply of each blank is held against the blank support by suction, operating through the apertures 63 in the periphery of the blank support. These apertures lead to the interior space

10 62, which communicates by means of the conduits 64 and 89 with a suitable exhausting apparatus (not shown), a stuffing box or any other well known form of joint in the connecting pipes permitting the blank support to rotate in constant communication with the

15 exhausting apparatus.

Under some circumstances it may be desirable to make and break the suction, in which case a controlling valve apparatus may be employed, like that shown in the Patent No. 591,175 Oct. 5, 1897. Thus the

20 blank support is in effect provided with a suction box for each blank, which travels with the blank in a constant relation thereto. The outer walls of these suction boxes, containing the apertures 63 preferably do not conform to the generally cylindrical contour of the

25 blank support, but are flat, one edge of each flat surface coinciding with the cylindrical surface of the blank support, approximately at the location of the defining edges 49 of the blades 47, on which the upper side of the blank is folded as a preliminary to making

30 the funnel folds, while the other edge is depressed a little below this surface as shown in Figs. 4 to 7. These two suction boxes cooperate alternately with the suction box 59 to draw apart the mouth ends of the two side walls of the blank, to permit the certain entrance

35 of the funnel folding blades into the side tucks of the blank, and then continue to hold down the lower side, preferably throughout the funnel fold forming operation. On each side of the blank support 31 is arranged a pair of funnel folding blades which rotate with the blank support and operate to turn over the upper side walls

40 of the blank. These devices comprise the defining blades 47 and the folding blades 48, which are mounted upon the slides 44 supported by the annular brackets 43 extending from the blank support. The defining

45 blades 47 are attached directly to the slides 44, while the folding blades 48 are attached to shafts 50 journaled in the slides, the axes of the shafts being in alinement with each other and with the defining edge 49 of the blade 47, while the outer or fold defining edges of both

50 blades 47 and 48 are substantially at an angle of 45 degrees with the axes of the shafts. Both pairs of blades 47 and 48 are carried into and out of engagement with the bellows sides of the blank, the defining blades passing over the upper side of the blank, while the

55 folding blades enter between the tucks. The folding blades then turn over the rearward end of the upper wall of the blank, and the uppermost ply of the bellows sides around the defining edges 49, the lower wall of the blank being meanwhile kept in place by the

60 atmospheric pressure over the suction apertures 63. In the case of very heavy bags such as flour sacks, etc. where the stiffness of the material causes more or less difficulty with the back folding operation, the side

65 grippers 83 are provided to cooperate with the suction apertures 63 in keeping the lower side of the blank in

place during the operation of the folders, and by their shape serve also to accurately define the lower triangular folds at their outer corners. The grippers 83 are pivotally supported by studs 84 on the brackets 43 and controlled by cams 86 and springs 87.

As a means for moving the folding blades laterally into and out of engagement with the side tucks of the blank, the slides 44 are provided with projections 46 which engage with the cam grooves 45 in the fixed cams 42. The oscillating movements of the folding blades 48 are effected by means of the pinions 52 which are held in the bifurcated lugs 54 on the bracket 43 and are splined to the shafts 50 by means of a spline of sufficient length to allow for the reciprocating movement of the slides. The pinions 52 mesh with the sector gears 51 which are mounted to swing on the studs 56 held in the lugs 91 on the brackets 43. The movement of the gears 51 is controlled by studs or rolls 57 which engage with the fixed cams 42, preferably in the cam grooves 58.

The inner ends of the blades 48, preferably project beyond the ends of the blades 47, as best shown in Fig. 1, in order that the blades 48 may safely enter the tucks, before the ends of the blades 47 reach the edges of the blank. In order to hold the upper ply of the blank close to the blank support in front of the defining line of the funnel mouth so that the defining blade 47 is sure to pass over the top of the blank and not into the bellows tuck, the blade 65 is provided which compresses the blank along the defining line just before the points of the blades 47 reach the edges of the blank. The blade 65 is mounted for rotation on the shaft 66 journaled in the uprights 21 and 22, the shaft being driven by the gear 67 which meshes with the gear 35. There is also provided a funnel defining blade 68 carried on an arm 70 which is mounted on a shaft 71 journaled in the uprights 21 and 22. One end of the shaft 71 carries a lever 92 which is pivotally attached to the upper end of an arm 73, the lower end of the arm being pivoted by the stud 93 on the approximately vertical slide 74 which moves in ways in the bracket 94 appurtenant to the upright 21. The slide 74 is provided with a stud 75 which runs in the groove 76 of the cam 95 on the shaft 77 journaled in the uprights 21 and 22 and is driven by the gear 78 which meshes into the gear 35. The motion imparted to the blade 68 by means of these devices, carries it toward and from the blank support, and thus enables it to cooperate with the blades 47 and 48 to form the funnel mouth folds, the edge 69 of the blade 68 being parallel to the defining edge 49 of the blade 47.

Disposed near the surface of the blank support is the plate 79 attached to the bar 96 supported on the uprights 21 and 22. The position of this plate is such that the blanks pass under it as they are carried forward by the blank support, after the completion of the funnel folding operation, and any tendency of the upper ply to again fold back on itself is thus overcome.

Just after the leading end of the blank has passed beneath the plate 79, the front gripper 38 is released, thus allowing the blank to be delivered from the blank support to the stripper plate 81. At the same time the blank is held to the support by means of the spool shaped pressing roll 80, fixed to the rotating shaft 77, the roll 80 being preferably recessed at 101 to allow at this point for the extra thickness in the bag bottom in case the mechanism is operating on finished bags. The

completed blank then passes from the plate 81 to the delivery rolls 97 and 98, which may be provided with tapes 82 to carry the blanks away from the machine.

The consecutive operation of this machine is as follows: The blank B is delivered to the rolls 23 and 24 in approximately the condition shown in Fig. 8, and passes upon the plate 99 being thus directed tangentially to the surface of the blank support 31. The leading end of the blank is gripped to the blank support by means of the finger 38, and the rear or mouth end of the blank lies directly over that part of the surface of the support which forms the outer wall of the suction box 62. When this end of the blank passes under the fixed suction box 59 the suction through the holes in the walls of both boxes draws the upper and lower plies of the blank apart, thereby opening the side tucks of the blank. At the position shown in Fig. 4 the end of the blank reaches the widest portion of the space between the fixed suction box 59 and the blank support at which time the projecting ends of the blades 48 enter between the tucks, and at the same time the compressing blade 65 compresses the blank along the defining line 19, which assists in distending the end of the blank, and also enables the ends of the defining blades 47 to pass safely over the blank, as the inward movement of the blades continues. The folding blades 48 are then turned by their shafts, thus turning upwardly and forwardly the upper wall of the blank around the edge 49, and thereby stretching open the mouth end of the blank as shown in Figs. 5 and 9. Then the blade 68 is moved toward the defining edge 49, as shown in Fig. 6 against the defining line of the blank. While the blade 68 remains in this position, the swinging blades 48 are turned back toward the blade 68 as shown in Fig. 7, thereby returning the lower wall of the blank to its first position, as shown in Fig. 10, and doubling the triangular side folds upon themselves upon the defining line around the edge of the blade 68, thus reversing the folds upon that line and leaving it in substantial coincidence and alinement with the axis of the swinging blades, and thereby forming on each side of the blank the two V-shaped funnel plies *f*. The blades 47 and 48 are then carried entirely away from the tucks, and the gripper 38 releases the forward end of the blank just before reaching the plate 81 which plate guides the blank between the rolls 97 and 98 while the pressing roll 80 feeds the blank forward. When the mouth end of the blank approaches the plate 79 the funnel defining blade 68 is gradually retracted and the funnel folds are held together by the plate 79, being finally compressed by passing between the rolls 97 and 98 and the tapes 82, to approximately the condition shown in Fig. 10, 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" and similar terms denoting relative position 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 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. Means for distending the end portion of a paper bag blank, comprising a rotatable cylindrical blank support having a portion of its blank supporting surface perforated and depressed below the cylindrical contour of that surface, means for exhausting the interior of the blank support adjacent to the perforations, a stationary suction box having a perforated surface disposed adjacent to the blank support in a substantially tangential relation to the cylindrical surface of the blank support, and means for exhausting the suction box. 70

2. Means for distending the end portion of a paper bag blank, comprising a rotatable cylindrical blank support having a portion of its surface perforated and depressed below the cylindrical contour, means for exhausting the interior of the blank support adjacent to the perforations, a stationary suction box having a perforated surface disposed adjacent and in substantial tangential relation to the cylindrical surface of the blank support, means for exhausting the suction box, and means for registering and holding a paper bag blank upon the support, whereby the end of the blank is disposed between the perforated surfaces of the blank support and the suction box when those surfaces come opposite each other during the rotation of the support. 75

3. Means for distending the end portion of a paper bag blank comprising a rotary blank support and a stationary suction box provided with suction surfaces which when cooperating to distend the blank are disposed on opposite sides of the rotary path of the blank and diverge from that rotary path in substantial conformity with the desired distention of the blank. 80

4. Means for distending the end portion of a paper bag blank comprising a rotary blank support and a stationary suction box having suction surfaces which when cooperating to distend the blank are disposed in opposite relation to each other and on opposite sides of the rotary path of the blank and diverge from each other in substantial conformity with the desired distention of the blank, means for exhausting air from the interior of the suction box and of the blank support adjacent to the said suction surface, and means for registering the said blanks upon the blank support. 85

5. Means for distending the end portion of a bellows-sided paper bag blank comprising a substantially cylindrical rotary blank support and a stationary suction box each having a suction surface the said suction surface of the blank support diverging inwardly and the said suction surface of the suction box diverging outwardly from the rotary path of movement of the cylindrical portion of the blank-carrier in substantial conformity to the desired distention of the end of the blank while cooperating to distend the blank, means for registering the blank upon the blank support, and means for defining the limit of the portion to be distended. 90

6. Means for defining distending and opening a portion of the end of the bellows-sided paper bag blank comprising a substantially cylindrical rotary blank support, means for registering the blank upon the support, defining blades mounted to move over the blank to define the limit of distention, a stationary suction box, and a pair of folding blades mounted to move into the side tucks of the blank the blank support and the suction box being provided with suction surfaces which while cooperating to distend the blank are adjacent to each other upon opposite sides of the rotary path of the blank support and diverge from said path in substantial conformity with the desired distention of the blank. 95

7. Means for defining distending and opening the end portion of a bellows-sided paper bag blank comprising a rotatable blank support, means for registering the blank thereon, a pair of defining blades mounted to move over the blank from opposite sides thereof to establish the defining line for the fold, a pair of rotatable folding blades for entering the side tucks of the blank, and suction apparatus having suction surfaces cooperating upon the blank 100

70

75

80

85

90

95

100

105

110

115

120

125

130

135

140

from opposite sides of the rotary path of the blank support the said suction surface being disposed in planes diverging from the said rotary path in substantial conformity with the desired distention of the blank.

- 5 8. Means for defining and opening the end portion of a paper bag blank, comprising a rotatable blank support, means for registering the blank upon the support, suction apparatus for separating the upper and lower plies of the blank, a pair of defining blades mounted to move over the
10 blank from the opposite edges thereof, to hold the blank down and define the cross fold line thereof, a pair of folding blades mounted to move into the side tucks of the blank, and to turn on an axis substantially in line with the cross fold line, and means for turning the said folding
15 blades forward and back while engaging the blank.

9. The combination of a rotatable cylindrical support for paper bag blanks, means for registering a blank upon the support, suction apparatus for separating the upper and lower plies of the blank, a pair of defining blades
20 mounted upon opposite sides of the support, to move over the blank and define the cross fold line, and hold down portions of the upper ply which are not to be turned over, a pair of folding blades mounted upon opposite sides of the blank support to move into the side tucks of the blank,
25 and to turn upon an axis substantially in line with the defining edges of the defining blades, and means for turning the said folding blades forward and back while engaging the blank.

10. The combination of a rotatable blank support for paper bag blanks, means for registering the blanks upon the support, suction apparatus for separating the upper and lower plies of the blank, a pair of slides mounted upon opposite sides of the support to move toward and from the edges of the blank, a pair of defining blades mounted upon
35 the said slides to move over and hold down a portion of the upper ply which is not to be turned over, with their edges defining the line on which to fold the turned-over portion, a pair of rotatable folding blades mounted upon the slides to move into the side tucks of the blank, means
40 for moving the slides toward and from the blank support, and means for turning the said folding blades forward and back while engaging the blank.

11. The combination of a rotatable blank support for paper bag blanks, means for registering the blank upon the support, a pair of defining blades mounted upon opposite
45 sides of the support, to move over and hold down portions of the blank which are not to be turned over, with their edges defining the line of fold of the turned-over portion, a pair of folding blades extending inwardly beyond the said defining blades to enter the tucks in advance of the pas-
50 sage of the ends of the defining blades over the edges of the blank, and a movable compressing blade for compress-

ing the blank upon the support below the path of the defining blades.

12. The combination of a rotatable blank support for paper bag blanks, means for registering a blank upon the support, a pair of defining blades mounted upon opposite sides of the support, to move over and hold down portions of the blank which are not to be turned over, with their edges defining the line of fold of the turned-over portion, a movable compressing blade for holding the blank below the path of movement of the defining blades, and a pair of rotatable folding blades mounted to enter the side tucks of the blank and having their inner ends projecting beyond the ends of the defining blades for precedent en-
65 gagement with the blank.

13. Means for forming the described funnel folds in the mouth end of a paper bag blank, comprising a traveling blank support, means for registering the successive blanks upon the support, suction devices for separating the upper and lower plies of the blank, means for opening the mouth end of the blank to form the preliminary triangular folds, and a reversing blade mounted externally to the blank support to cooperate in doubling the said triangular folds to form the said funnel folds.
75

14. Means for forming the described funnel folds in the mouth end of a paper bag blank, comprising a rotatable blank support, means for registering the successive blanks upon the support, suction devices for separating the upper and lower plies of the blank, means for folding the rear-
80 ward end of the upper ply in a forward direction to form the preliminary triangular folds, and a movable reversing blade mounted to cooperate in doubling the said triangular folds to form the said funnel folds.

15. Means for forming the described funnel fold in the mouth end of a paper bag blank, comprising a rotatable cylindrical blank support, means for registering the successive blanks upon the support, suction devices for separating the upper and lower plies of the blank, defining blades mounted to move over and hold down portions of the blank which are not to be turned over and to define the line of fold of the turned-over portion, a pair of folding blades for folding the upper ply of the blank over upon the folding line, and a reversing blade mounted to swing upon a fixed axis outside of the carrier, and to engage with the reversed fold line of the blank as the said line is carried past its point of nearest approach to the axis of the reversing blade.
95

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses. 100

WILLIAM A. LORENZ.

Witnesses:

HANS MALLNER,
WM. H. HONISS.