J. MERRITT.

PAPER BAG MACHINE.

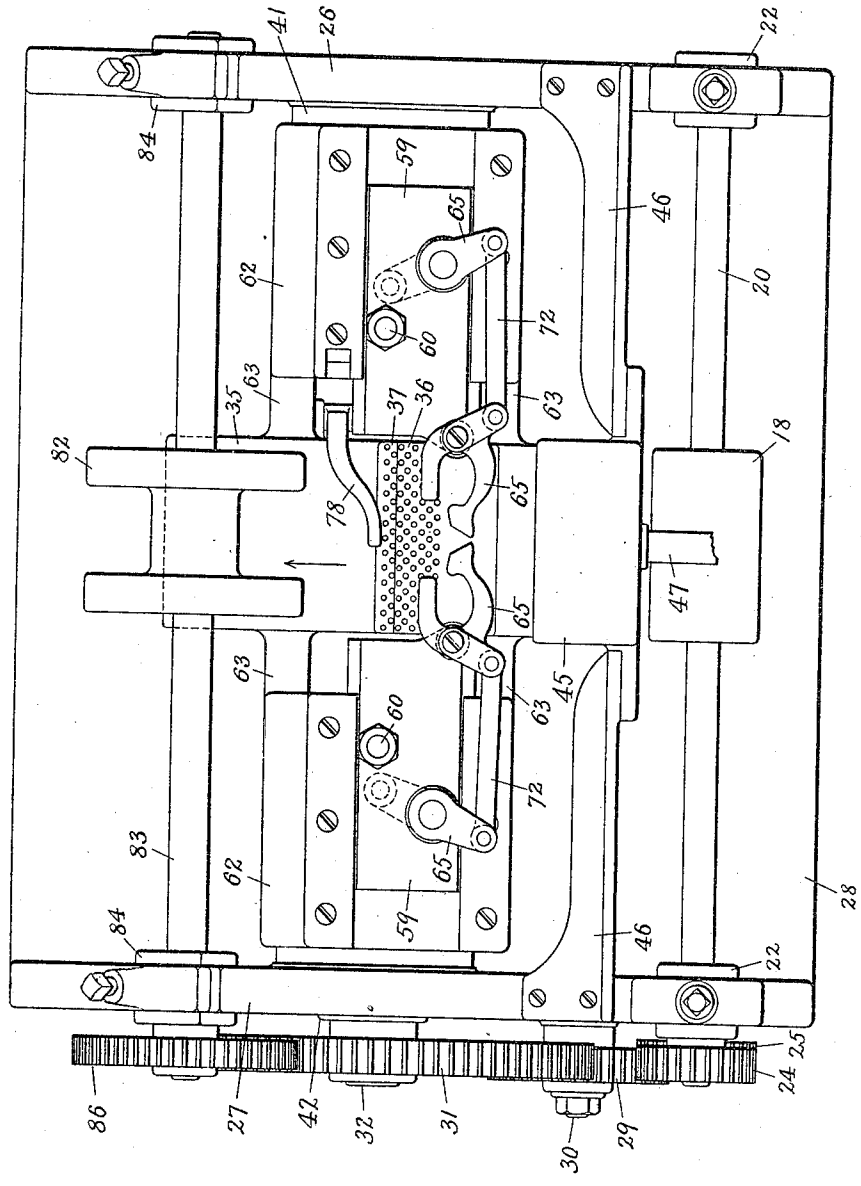
APPLICATION FILED JULY 10, 1907.

960,664.

Patented June 7, 1910.

6 SHEETS—SHEET 1.

Fig. 1



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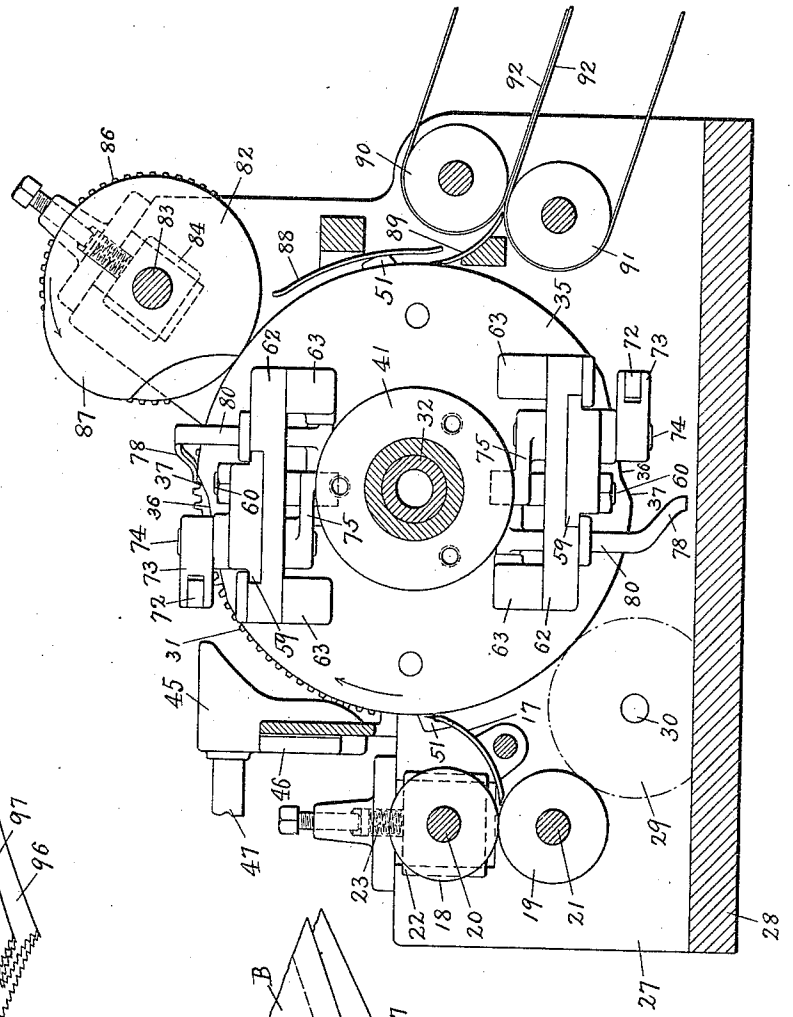

Fig. 2

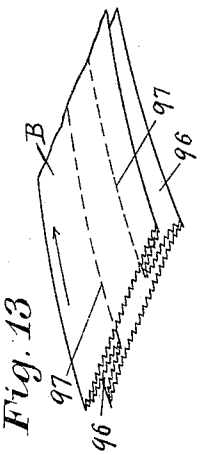

Fig. 13

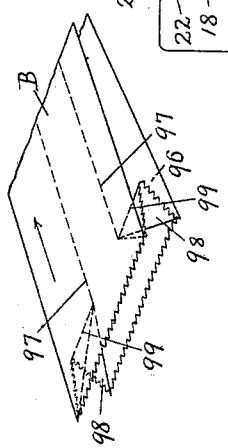

Fig. 14

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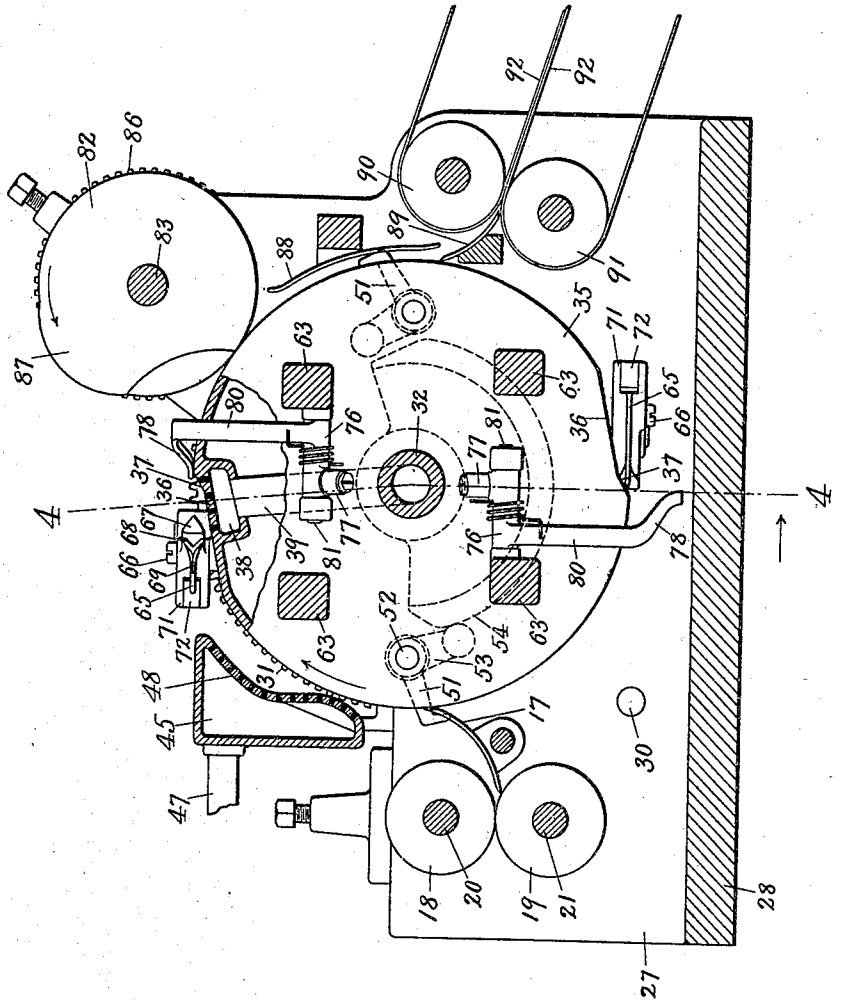
6 SHEETS—SHEET 3.

Fig. 3



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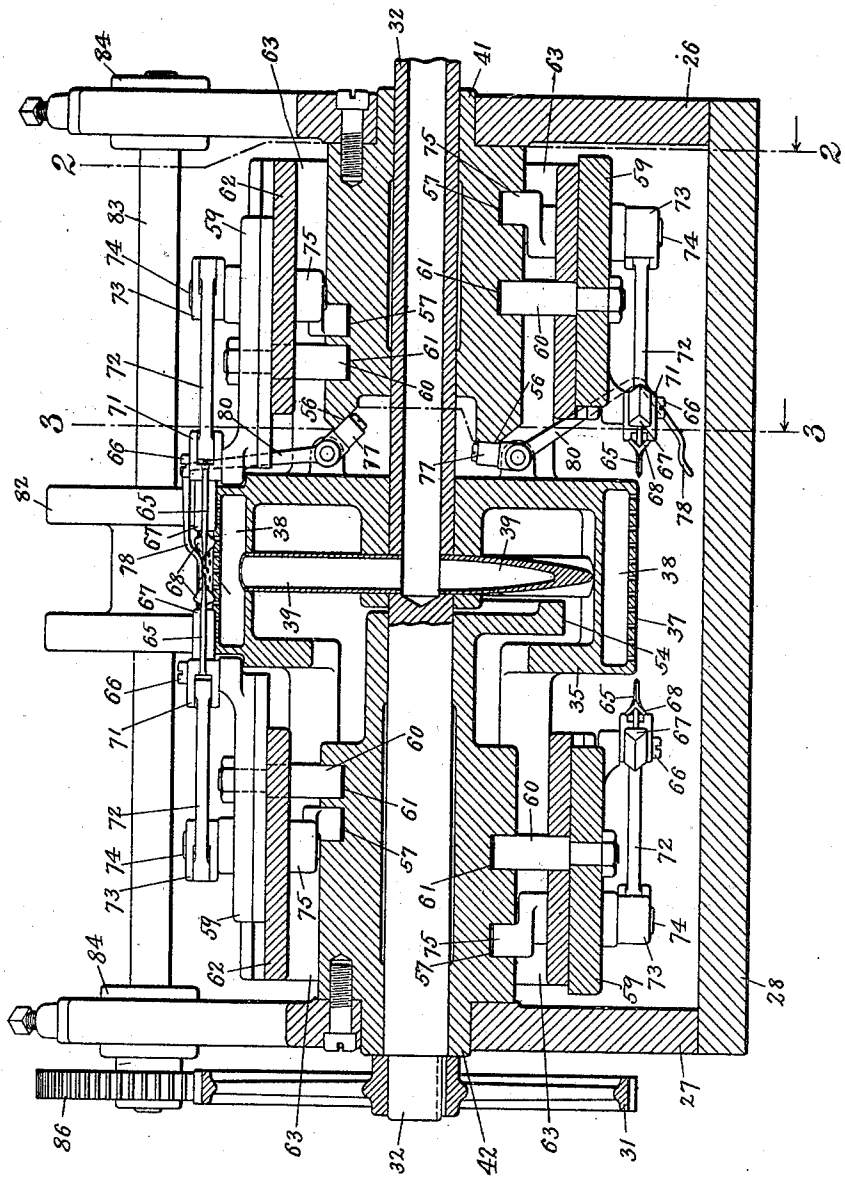
6 SHEETS—SHEET 4.

Fig. 4



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6 SHEETS—SHEET 5.

Fig. 5

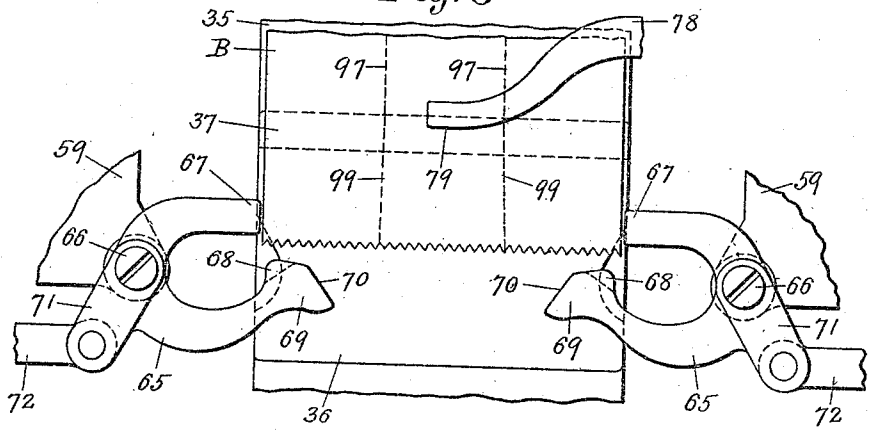


Fig. 6

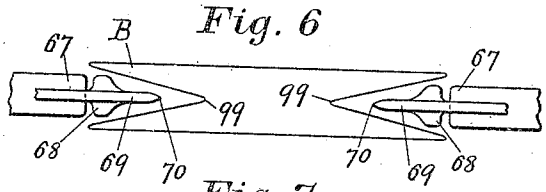


Fig. 7

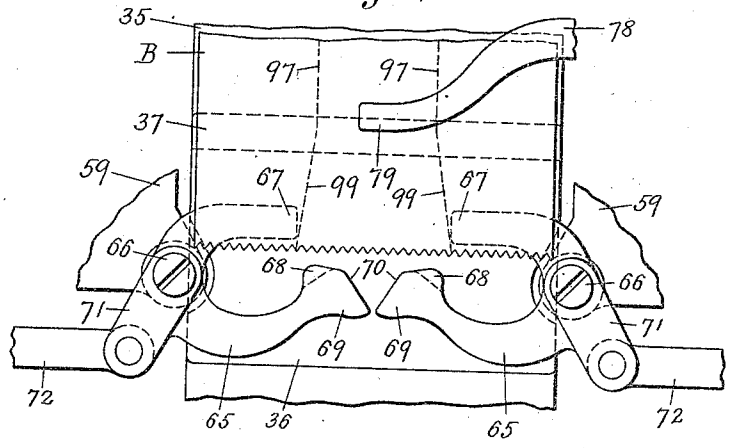
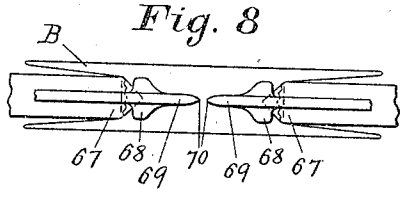


Fig. 8



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6 SHEETS—SHEET 6.

Fig. 9

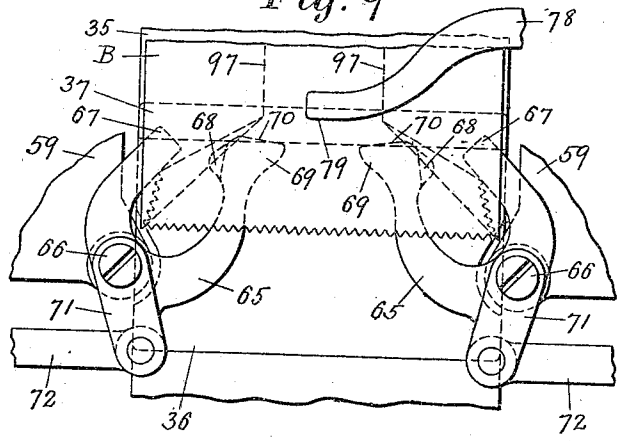


Fig. 10

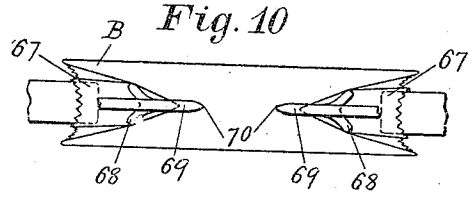


Fig. 11

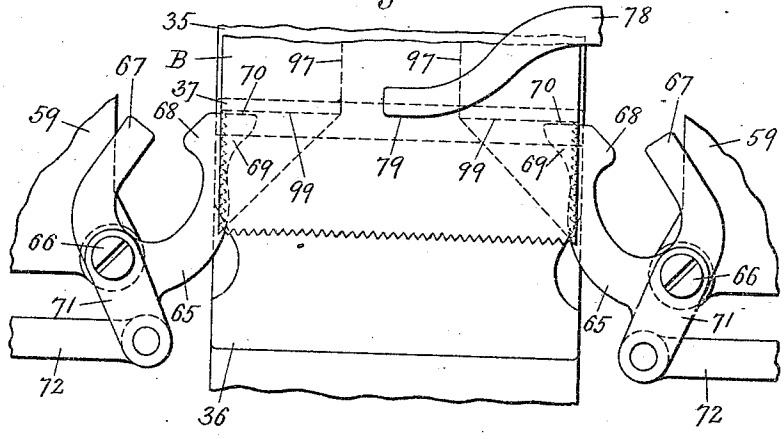
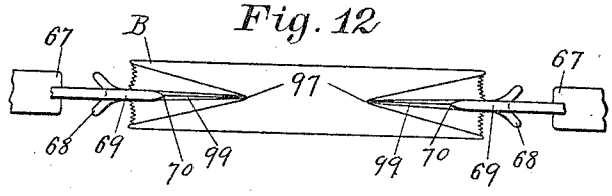


Fig. 12



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UNITED STATES PATENT OFFICE.

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PAPER-BAG MACHINE.

960,664. Specification of Letters Patent. Patented June 7, 1910.

Application filed July 10, 1907. Serial No. 383,042.

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 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, while filling it. 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 distending the side tucks at the mouth end of the blank. A pair of distending fingers move into the side tucks and partly open them along the inner fold lines of the tucks, as upon a hinge. Then a pair of implements herein designated as sweepers enter the mouth end of the blank, and move against the inner fold lines of the side tucks, first centering them with the sweepers, and then sweeping them outward and reversing the folds along the said lines for a distance about equal to the depth of the side tucks of the blank, thus leaving these reversed fold lines at right angles to their former 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 it is preferred to employ the invention in a machine which operates in conjunction with mechanism for folding the bottom 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 my present invention. Fig. 2 is an end view in section on the line 2—2 of Fig. 4. Fig. 3 is an end view in section on the line 3—3 of Fig. 4. Fig. 4 is a front view in section on the line 4—4 of Fig. 3. Figs. 5, 7, 9 and 11 are plan views, and Figs. 6, 8, 10, 12 are corresponding front views, respectively, showing a portion of the folding devices in successive stages of operation upon the mouth of a paper bag or blank. Figs. 13 and 14 are perspective views of the mouth of a bellows-sided bag blank in two stages, Fig. 13 shows the blank before it has been folded, and Fig. 14 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 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 it is 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. 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, journaled in the bearings 41 and 42, which are attached to the uprights 26 and 27, respectively, and serve also as cam bodies. The blank support 35 is approximately cylindrical, and is carried by the shaft 32.

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, supported by the brackets 46, secured to the uprights 26 and 27, the wall 48 of this box adjacent to the blank support 35 being provided with perforations leading into the interior of the box. 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 96 (Fig. 13) sufficiently to permit the certain entrance therein of the funnel sweepers. This suction box is connected by a pipe 47 with any desired or available vacuum apparatus.

The rotating blank support 35 carries one or more sets of gripping and folding devices to which suitable movemnts 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.

The gripping device consists of a gripper 51 attached to a shaft 52, having an arm 53 provided with a roller or projection which is held against the fixed cam 54 by a suitable spring. The cam 54 is supported by the fixed cam body 42, and may be separate, or be integral therewith, as shown in the drawings.

Each of the two sets or sections of the blank support 35 is provided with a flattened portion 36, extending across the blank support, and having a little of its forward zone 37 inclined upward toward its line of mergence into the cylindrical surface of the blank support. The forward part of this flattened area 36, including the inclined zone 37, for a distance longitudinally of the blank about equal to the depth of the side tucks 96 of the blank, is provided with perforations leading into the interior of a suction box 38, formed within or secured inside of the blank support 35. This suction box 38, by causing the lower ply of the blank to adhere strongly to the surface 36, first cooperates with the fixed suction box 45 in opening out the side tucks 96, and then sustains the lower ply of the blank in position while the funnel sweepers are operating on the adjacent side tucks. Connection with suitable exhausting apparatus is made through the pipe 39, and the hollow shaft 32, connected with a suction pipe to which is also connected the pipe 47, leading to the fixed suction box 45. These pipes may be provided with gates or valves for cutting off connection with the boxes 45 and 38, or for allowing communication therewith at suitable intervals during the passage of the blank through the machine, like the devices shown and described in U. S. Patent #591,175 of Oct. 5, 1897.

Adjacent to the suction box 38 and on each side of the blank support 35 is arranged a pair of tuck folders which rotate with the blank support and serve to sweep the mouth ends of the side tucks outwardly and reverse them along the line 97 for a distance from the mouth end about equal to the depth of the side tucks, thus causing the reversed portion 99 of these fold lines to stand at right angles to their former position and producing the small triangular funnel folds 98 in the mouth end of the blank (Fig. 15).

In their preferred construction each of these tuck folders consists of a bifurcated or C-shaped member, the two arms of which engage the blank on opposite sides of the inner fold line of the side tucks, the outer or forward arm 67 serving as a distending finger by pushing into the tuck from its outer side so as to separate and distend the side tucks close to the inner fold line. The inner or rearward arm 65 of the C serves as a sweeper, being disposed so as to engage the inner side of the tuck and sweep it outwardly, reversing the fold of the tuck at the inner fold line and pushing that line outwardly between the reversed sides of the tuck.

It will be understood that these tuck folders may be used with many different forms of folding beds or blank supports or carriers, and may even be employed as hand-operated devices. The invention however, is herein shown to be embodied in a rotary type of machine, that being considered of high if not the highest efficiency. In this rotary type of machine the tuck folders are mounted for rotation with the rotary blank support and are preferably appurtenant to or carried by that support, being mounted thereon for oscillation upon an axis substantially at right angles to the surface of the blank support, with the C-shaped arms oscillating substantially in the plane of the side tucks of the blanks carried by the support. The forward or blank engaging ends of the distending arms or fingers 67 are preferably beveled or rounded, as best shown in Figs. 3 and 8 to facilitate their entrance into the V-shaped side tucks of the blank. The sweeper 65 is provided with means for centering the inner edge of the bellows-sided tuck with the fold reversing blade 69, so that that blade will engage with the blank substantially at or along the inner fold line, and reverse the tucks upon that line, as upon a hinge. This tuck-centering portion of the sweeper is preferably bifurcated, as best shown in Figs. 3, 10, and 12, forming a pair of V-shaped

wings 68 opening toward and adjacent to the distending finger 67. The reversing blade portion 69 of the sweeper is preferably made comparatively thin, so as to extend into the acute angle between the funnel folds (Figs. 11 and 14), being thereby enabled to follow that fold line throughout its reversing movement. The centering portion 68 of the sweeper 65 preferably merges smoothly and gradually into the edge 70 of the reversing blade portion 69 of the sweeper.

These tuck holders are mounted for oscillatory movement upon studs 66, which in this case are situated substantially at the center of the back of the C-shaped form of each folder. For greater completeness and smoothness of the folding action, the tuck folders are by means of their studs 66 mounted upon slides 59, by means of which a lateral movement of the tuck folder relative to the side of the blank is imparted in addition to the rotary or oscillatory movement of the folder, upon its studs 66. But this lateral movement is not considered essential in all cases, since fair results may be obtained by establishing the pivot axis of the tuck folder at a suitable distance from, and in suitable relation to, the fold to be made. The slides 59 are fitted to slide in ways in the base 62, which is supported by the arm 63 extending from the blank support 35.

The swinging movement of the sweeper 65 may be also obtained in various ways. In the present instance it is obtained by the use of arms 71 connected by links 72 to levers 73, secured to the shafts 74 journaled in the slides 59. To the lower ends of the shafts 74 are secured the cam arms 75, whose outer ends project into the cam paths 57 formed in the cam bodies 41 and 42. Each section of the blank support is also provided with a retaining finger 78 which rotates with the blank support and is mounted to swing back and forth so as to engage the longitudinal center of the blank adjacent to the mouth during the folding operation. The rear edge 79 of that part of the finger 78 which engages the blank is substantially in alinement with the edge 70 of the sweepers when these are in their most forward position (Fig. 11). The finger 78 cooperates with the sweepers 65 by preventing the middle portion of the upper ply of the blank from rising from the support 35 during the folding operation, thereby also preventing the inner fold lines 97 from being reversed beyond the desired point. The finger 78 is secured to the arm 80, the lower end of which forms a hub 76 which is mounted on the shaft 81 supported in bearings appurtenant to the blank support 35. The hub 76 is provided with a roll or projection 77, held by a spring in engagement with the cam 56 formed in the fixed cam body 41, the cam 56 thus producing the requisite swinging movement of the finger 78. The blank is also held to the support 35 by the bifurcated pressing roll 82 fixed to the rotating shaft 83 mounted in spring-pressed bearings 84 in the uprights 26 and 27, the shaft 83 being driven by the gear 86 which meshes with the large gear 31. The pressing roll 82 serves to drive the blank forward after the gripper 51 has been released, and also serves to flatten down the mouth end of the blank after the completion of the folding operation, the enlarged portion 87 of the periphery matching the depression 36 in the surface of the blank support 35.

The flattening plate 88 serves to retain the mouth in compressed condition after it passes the roll 82, and the delivery plate 89 guides the blank between the rolls 90 and 91 to the tapes 92 by which it is carried away from the machine, the gripper 51 releasing the front end just before it reaches the plate 89.

The consecutive operation of this machine is as follows:—The blank B is delivered to the machine in approximately the condition shown in Fig. 13 and passes over the receiving plate 17, being deflected upward thereby and thus directed tangentially to the surface of the blank support 35. The leading end of the blank is then gripped to the blank support 35 by means of the gripper 51. When the rear or mouth end of the blank arrives opposite the suction box 45, the suction through the perforations draws the upper ply of the blank away from the lower ply, and as the latter is held in position on the blank support 35 by the suction through the perforations in the surfaces 36 and 37, the upper and lower plies are separated and the side tucks 96 opened. The ends of the distending fingers 67 are then carried into those tucks by the movements of the slides 59, advancing far enough to distend the rear portions 99 of the inner folds 97 (Figs. 7 and 8). The tuck folders are then swung outwardly on their pivots 66, centering the tucks and sweeping them outwardly toward the edges of the blank. The thin following edges 70 reverse the inside folds along the lines 99 and carry them outward at right angles to their former position as the tuck folders are withdrawn from the tucks (Figs. 9 to 12) thereby forming on each side of the blank the two V-shaped funnel plies 98. During this folding operation, the action of the tuck folders is assisted by the shape which the lower ply assumes in fitting closely to the surfaces 36 and 37 of the blank support, the depressions giving room for the manipulation of the inner fold by the swinging motion of the tuck folders, this manipulation

being at the same time restrained from exceeding its proper area by the adjacent higher portion of the blank support to which the blank is held by the retaining finger 78. As the sweepers 65 are withdrawn, the finger 78 swings back and the blank passes under the pressing roll 82, which flattens down the funnel folds. The gripper 51 releases the forward end of the blank just before reaching the plate 89, which plate guides the blank between the rolls 90 and 91, while the pressing roll 82 feeds the blank forward. When the mouth end of the blank leaves the roll 82 the folds are kept flattened by the plate 88, being finally compressed by passing between the rolls 90 and 91 to the tapes 92 in approximately the condition shown in Fig. 14, in which however, the blank is shown opened to a slight extent in order to more clearly represent the character of the funnel folds produced by this operation.

In the preferred construction here shown the tuck folder is made in a single integral piece, so that the two blank engaging ends move concurrently, in a fixed relation to each other. But this integral construction is not a necessity, as the same functions can be performed by separate members mounted for independent movement. The rotary movement also is not a necessity, but may be replaced by a combination of straight or curved line movements. Neither is it necessary to adhere to the exact shapes of the ends as shown, as these allow a wide variation which will be more or less dependent upon the specific movement of each end, as is evident to anyone skilled in machinery and operations of this class.

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. A rotary sweeper for reversing the tucks of bellows-sided bags provided with means for engaging the inner side of the tuck on each side of the fold line thereof to center the said tucks with the sweeper, and with an adjacent blade portion for pushing the said fold line outwardly between the reversed tucks.

2. A rotary sweeper for reversing the bellows-side tucks of a paper bag blank, having a bifurcated portion for engaging with the inner V-sides of the tuck to center the tuck with the sweeper, and a central blade portion for engaging with the said fold line and pushing it outwardly between the said V-sides.

3. Means for forming the described funnel folds in bellows-sided bag blanks, including a bifurcated implement, one arm of which is a tuck distending finger for entering the tuck from its outer side, and the other arm of which is a sweeper for engaging with the inner side of said tuck and reversing it along the central fold line.

4. Means for forming the described funnel folds in bellows bag blanks, including a tuck folder having a distending finger for entering the tuck from its outer side, and a sweeper finger for engaging with the inner side of said tuck and reversing it along the central fold line, and means for moving the said fingers into and out of the blank.

5. Means for forming the described funnel folds in bellows-sided bag blanks, including a tuck folder having a distending finger for entering the tuck from its outer side, a sweeper finger for engaging with the inner side of said tuck and reversing it along the central fold line, means for moving the said fingers into operative relation to the blank, and means for swinging the said fingers while in said operative position.

6. Means for forming the described funnel folds in bag blanks, including a bifurcated implement, one arm of which is a distending finger for entering the tuck from its outer side, and the other arm of which is a sweeper finger for engaging with the inner side of said tuck and reversing it along the central fold line, means for mounting and oscillating the said implement in the plane of its bifurcations, and means for moving the implement into and out of operative relation to the blank.

7. Mechanism for reversing the tuck sides of bellows-sided blanks, having in combination a distending finger for entering the outer side of the tuck and distending it, and a rotary sweeper finger provided with a bifurcated portion for receiving and centering the inner side of the distended tuck, and a blade portion for engaging the said fold line and pushing it outwardly between the reversed sides of the tuck.

8. A tuck reversing folder for bellows-sided bag blanks, including in combination a tuck distending finger, and a rotary sweeper having their blank engaging ends adjacent to and approximately facing each other, the sweeper being provided with means for centering the inner side of the tuck with the sweeper.

9. A tuck reversing folder for bellows-sided bag blanks mounted for oscillation and including in combination a distending finger, and a sweeper disposed adjacent to each other and approximately in the same plane

of oscillatory movement, with the distending finger on the outer side of the tuck and the sweeper on the inner side of the tuck.

10. A tuck reversing folder for bellows-sided bag blanks, comprising an approximately C-shaped member mounted for oscillation substantially in the plane of the tuck, one arm of the C constituting a distending finger on the outer side of the tuck and the other arm of the C constituting a sweeping finger on the inner side of the tuck.

11. A tuck reversing folder for bellows-sided bag blanks, comprising an approximately C-shaped member mounted for oscillation substantially in the plane of the tuck, one arm of the C constituting a distending finger on the outer side of the tuck and the other arm of the C constituting a sweeping finger on the inner side of the tuck, and means for carrying the said arms upon the opposite sides of the tuck, and sweeping the tuck outwardly.

12. Mechanism for forming the described funnel folds in a bellows-sided bag blank, having in combination a blank support, a distending finger for entering and distending the side tucks of the blank, and a rotary sweeper provided with a centering portion for receiving and centering the inner V-side of the tuck, and a blade for engaging the central fold line of the said tuck, and pushing it outwardly between the reversed plies of the tuck.

13. Mechanism for forming the described funnel folds in the ends of bellows-sided bag blanks, including in combination a blank support, a distending finger and a sweeper mounted for swinging movement, to carry the finger into a side tuck of the blank, and to carry the sweeper into the mouth end of the blank and against the inner side of the side tuck, the sweeper being provided with a centering portion and a blade portion for pushing the center fold line outwardly between the reverse plies of the tuck.

14. Mechanism for forming the described funnel folds in bag blanks, including in combination a rotary blank support, means for distending the mouth end of the side tucks of the blank, a sweeper carried by the blank support and provided with a centering portion and with a blade shaped tuck reversing portion, and means for operating the said sweeper concurrently with the rotations of the blank support.

15. Means for forming the described funnel folds in bellows-sided bag blanks, including a bifurcated tuck folder mounted for oscillation substantially in the plane of the tuck, and having its bifurcations disposed adjacent to each other in the said plane, comprising a distending finger for the outer side of the tuck, and a sweeping finger for the inner side of the tuck.

16. Means for forming the described funnel folds in bellows-sided bag blanks, including a bifurcated tuck folder mounted for oscillation substantially in the plane of the tuck, and having its bifurcations disposed adjacent to each other in the said plane, comprising a distending finger for the outer side of the tuck, and a sweeping finger for the inner side of the tuck, and means for entering the said fingers on the opposite sides of the tuck and sweeping the tuck outwardly to reverse the said tuck and form the said folds.

17. Means for forming the described funnel folds in bellows-sided bag blanks, including in combination a blank support, a tuck folder mounted for oscillation upon an axis substantially at right angles to the surface of the support, and substantially in the plane of the tuck of a blank carried by the support, the said tuck folder consisting of a distending finger and a sweeping finger extending substantially in a C shape form upon opposite sides of the tuck.

18. Means for forming the described funnel folds in bellows-sided bag blanks, including in combination a blank support, a tuck folder mounted for oscillation upon an axis at substantially right angles to the surface of the support, and substantially in the plane of the tuck of a blank carried by the support, the said tuck folder consisting of a distending finger and a sweeping finger extending substantially in a C shape form upon opposite sides of the tuck, and means for moving the said folder to engage the inner and outer sides of the tuck and sweep it outwardly.

19. Means for forming the described funnel folds in bellows-sided bag blanks, including in combination a blank support, a tuck folder mounted for oscillation upon an axis at substantially right angles to the surface of the support, and substantially in the plane of the tuck of a blank carried by the support, the said tuck folder consisting of a distending finger and a sweeping finger extending substantially in a C shape form upon opposite sides of the tuck, means for moving the tuck folder laterally relative to the blank, and means for swinging the blank engaging ends of the said folder outwardly to form the said funnel folds.

20. Mechanism for forming the described funnel folds in the mouth end of bellows-sided bag blanks, including in combination a blank support, a rotary sweeper carried by the support and having a blank engaging end mounted to swing outwardly against the inside of the inner fold line of the tuck and sweep that line outwardly.

21. Mechanism for forming the described funnel folds in the mouth end of bellows-sided bag blanks, including in combination a blank support, a sweeper mounted on the support for rotation substantially in the

plane of the tuck of a blank carried by the support, and means for swinging the sweeper outwardly against the inside of the inner fold line of the tuck to sweep that line outwardly and reverse the tuck.

22. Means for forming the described funnel folds in bellows-sided bag blanks, including in combination a rotary blank support, a pair of tuck folders mounted for rotation with the support, and including a pair of outwardly swinging oscillatory fingers for engaging with the inner sides of the bellows-sided tucks, and sweeping them outwardly.

23. Means for forming the described funnel folds in bellows-sided bag blanks, including in combination a rotary blank support, a pair of sweepers mounted for revolution with the support, and for oscillation substantially in the plane of the side tucks of a blank carried by the support, and means for swinging the said sweeper fingers outwardly against the inner sides of the mouth ends of the tucks and sweeping them outwardly.

24. Means for forming the described funnel folds in bellows-sided bag blanks, including in combination a rotary blank support, a pair of tuck folders mounted for rotation with the support and for oscillation substantially in the plane of the tucks of a blank carried by the support, each of the said tuck folders comprising a distending finger for the outer side of the tuck and a sweeper finger for the inner side of the tuck.

25. Means for forming the described funnel folds in bellows-sided bag blanks, including in combination a rotary blank support, a pair of tuck folders mounted for rotation with the support and for oscillation substantially in the plane of the tucks of a blank carried by the support, each of the said tuck folders comprising a distending finger for the outer side of the tuck and a sweeper finger for the inner side of the tuck, and means for rotating the said folders to engage with their respective tucks and sweep them outwardly.

26. Means for forming the described funnel folds in bellows-sided bag blanks, including in combination a rotary blank support, suction devices for opening the mouth ends of the tucks, a pair of sweepers mounted for rotation with the blank support and for oscillation substantially in the plane of the side tucks, and means for swinging the said sweepers outwardly against the inner sides of the said tucks in conjunction with the operation of the suction devices.

27. Means for forming the described funnel folds in bellows-sided bag blanks, including in combination a rotary blank support, means for distending the mouth end of the blank, a pair of sweepers mounted for rotation with the support, and for oscillation in the plane of the side tucks of the blank, and a retaining finger mounted at the side of the blank support for oscillation over and substantially upon the center of the blank.

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

JOSEPH MERRITT.

Witnesses:
CAROLINE M. BRECKLE,
NELLIE PHOENIX.

Correction in Letters Patent No. 960,664.

It is hereby certified that the assignee in Letters Patent No. 960,664, granted June 7, 1910, upon the application of Joseph Merritt, of Hartford, Connecticut, for an improvement in "Paper-Bag Machines," should have been described and specified as *Union Paper Bag Machine Company*, instead of "Union Paper Bag Company," as shown by the record of assignments in this office; and that the said Letters Patent should be read with this correction therein that the same may conform to the record of the case in the Patent Office.

Signed and sealed this 30th day of August, A. D., 1910.

[SEAL.]

F. A. TENNANT,

Acting Commissioner of Patents.