No. 816,193. PATENTED MAR. 27, 1906.

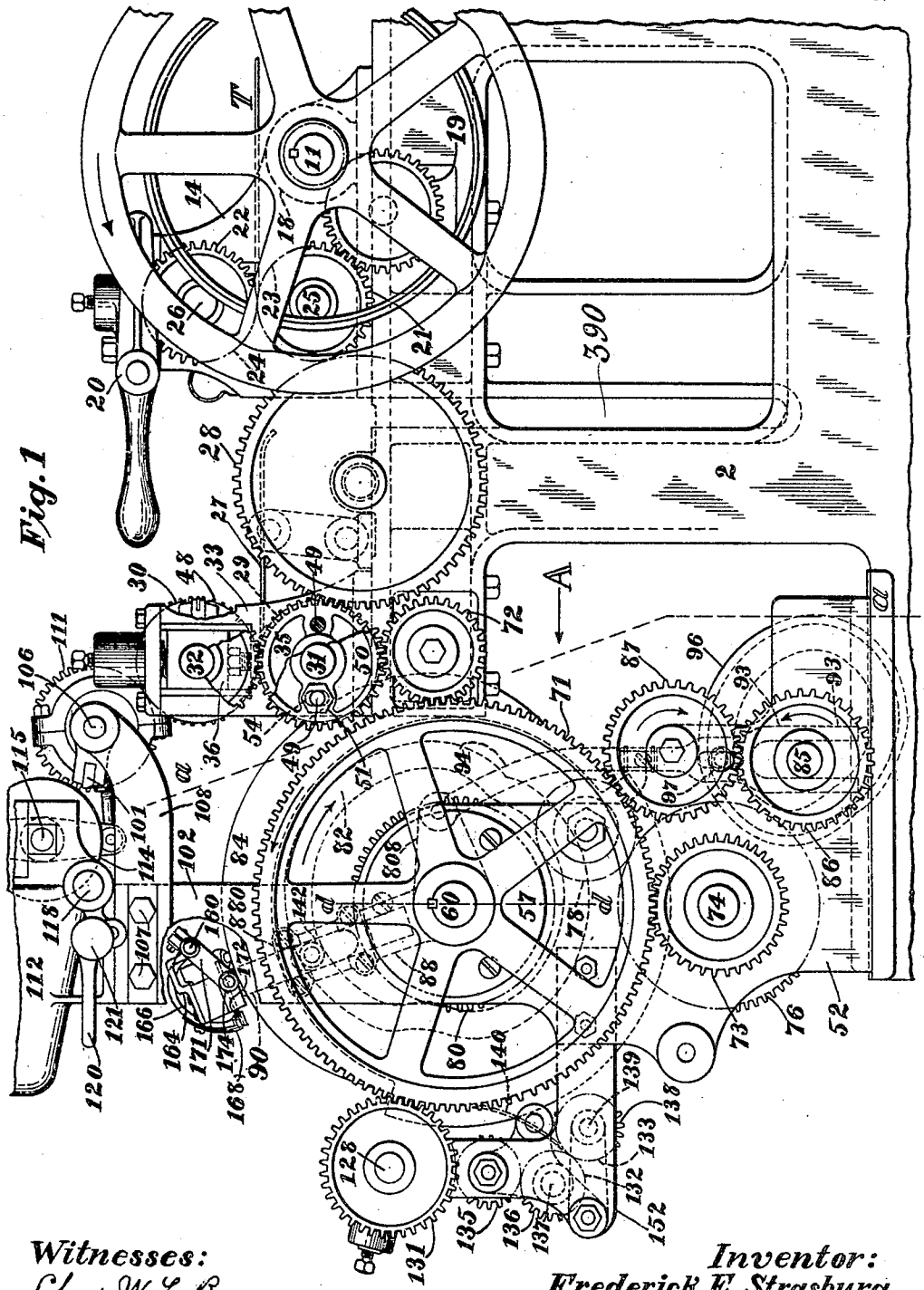
F. E. STRASBURG.

PAPER BAG MACHINE.

APPLICATION FILED MAR. 9, 1905.

9 SHEETS—SHEET 1.

Fig. 1



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9 SHEETS—SHEET 2.

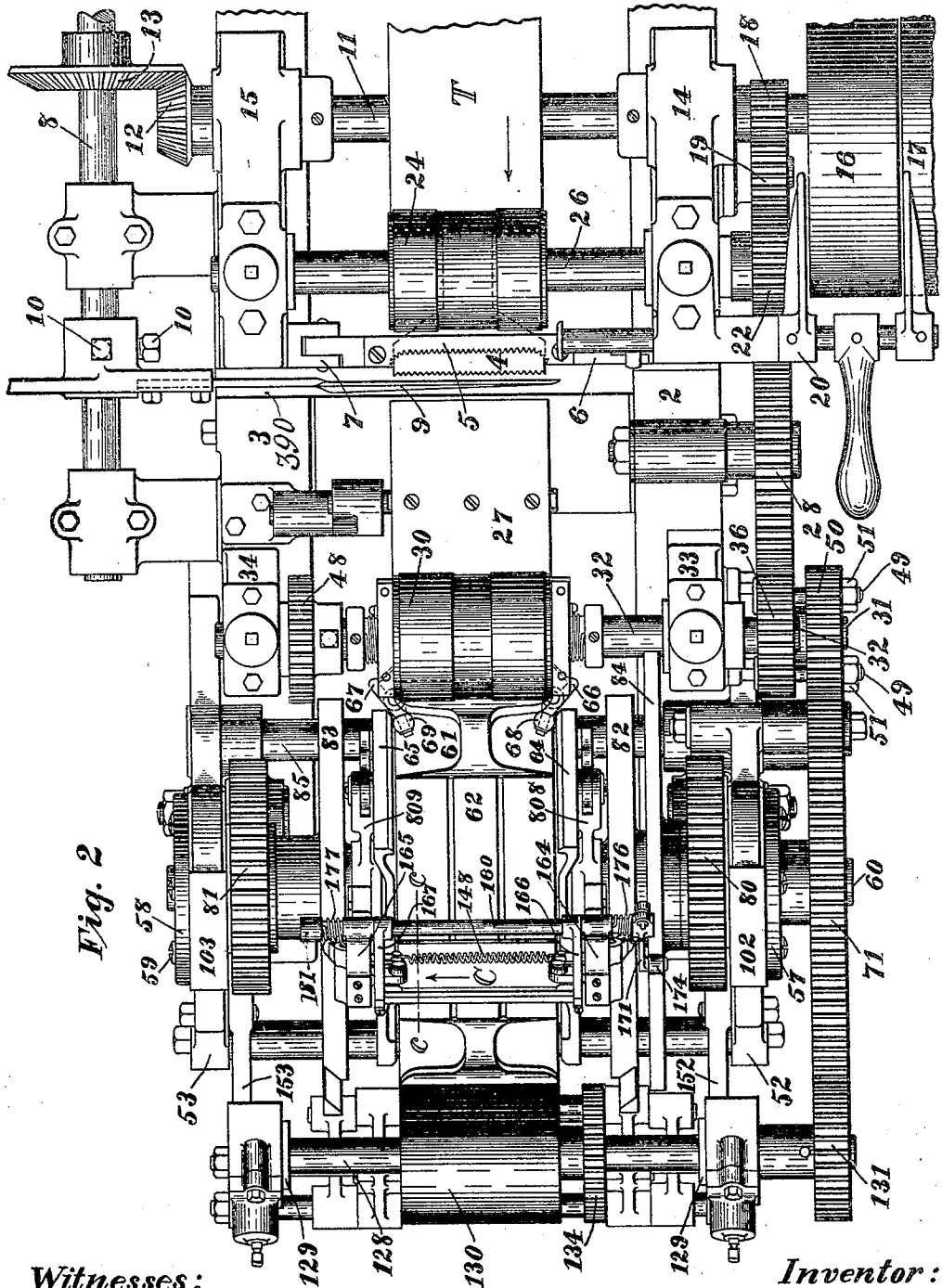

Fig. 2

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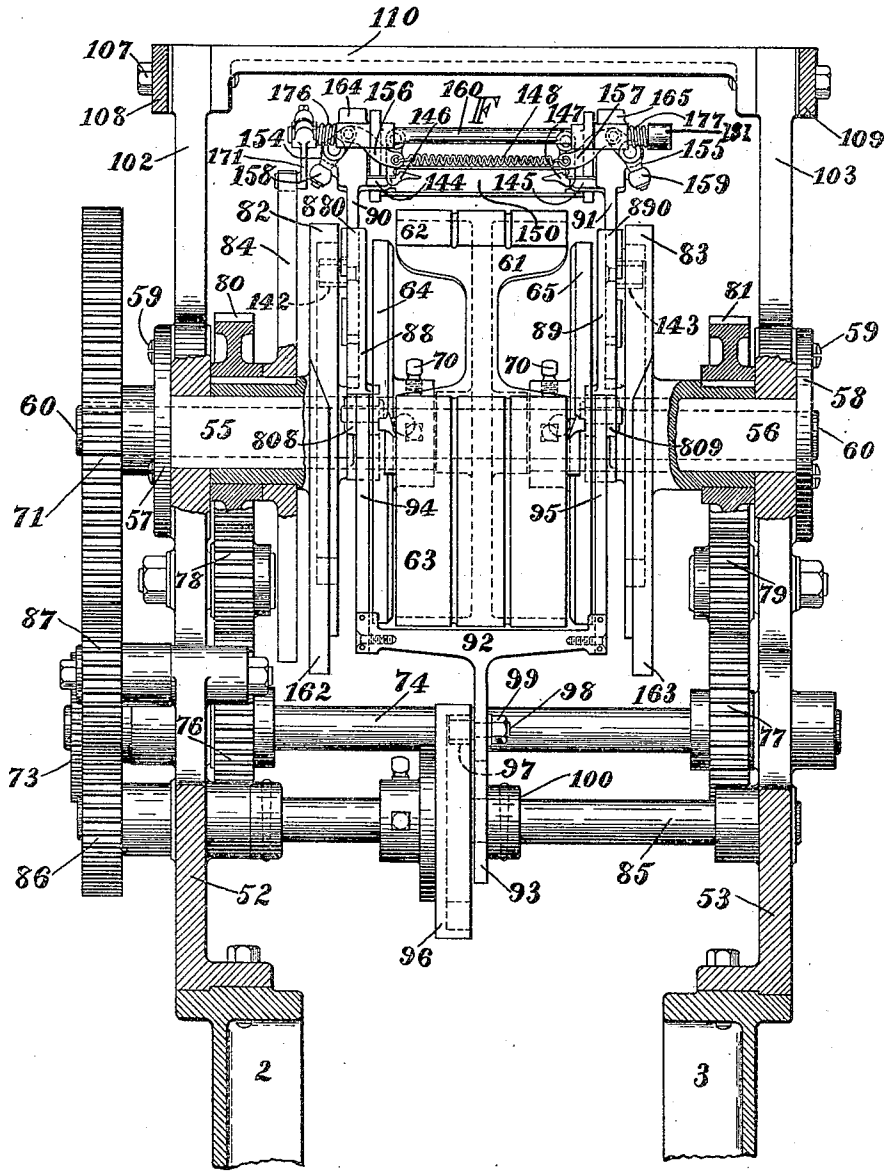
9 SHEETS—SHEET 3.

Fig. 3



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9 SHEETS—SHEET 4.

Fig. 4

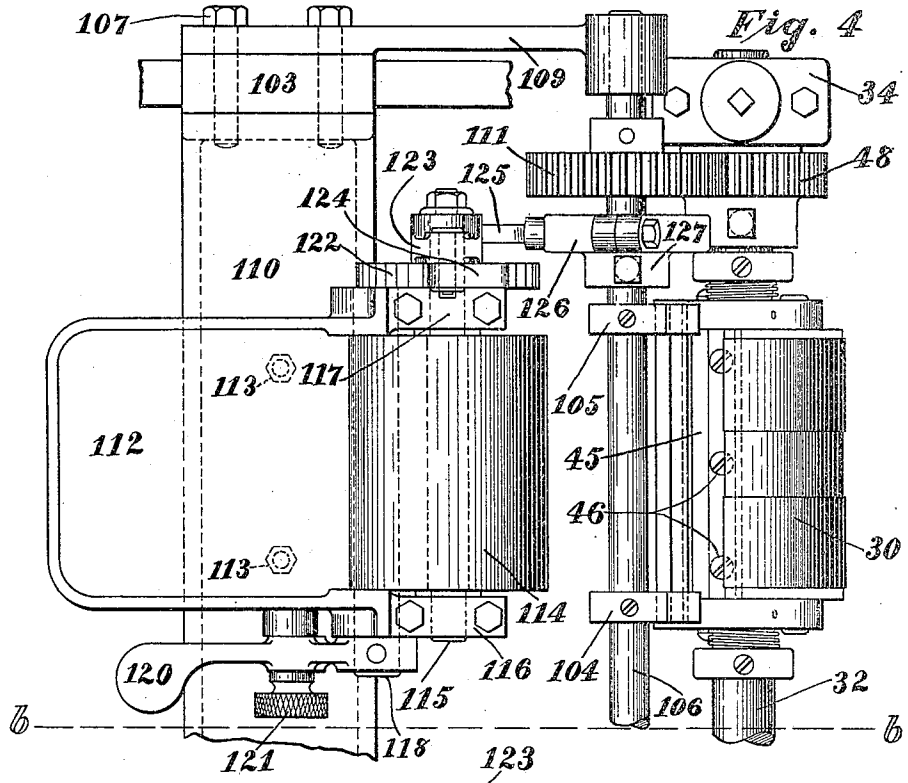
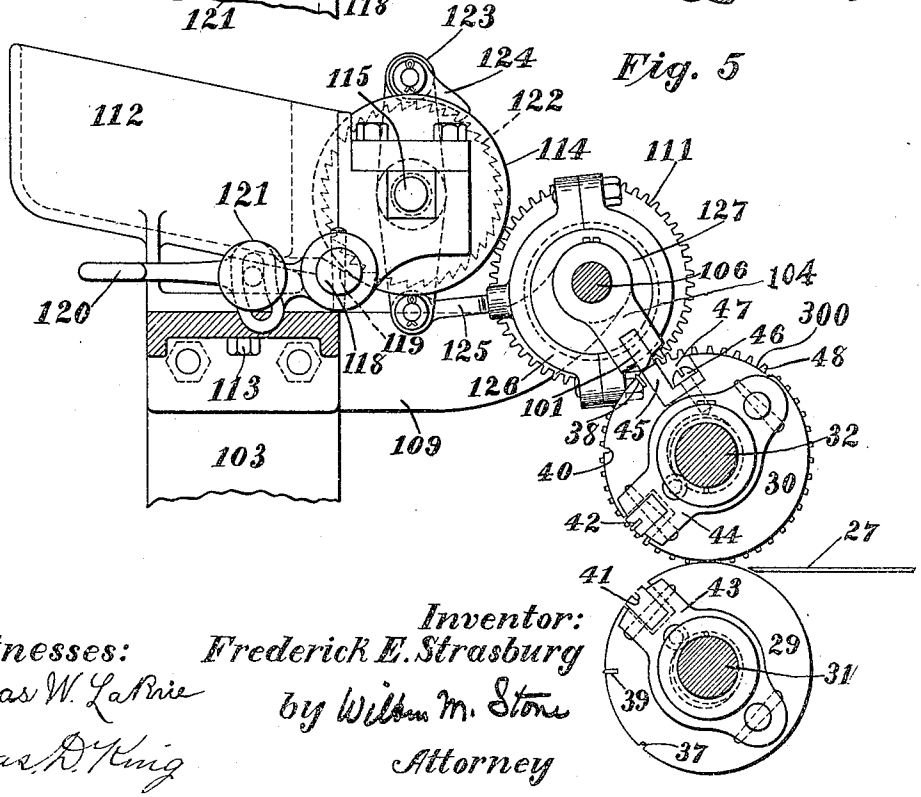


Fig. 5



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9 SHEETS—SHEET 5.

Fig. 8

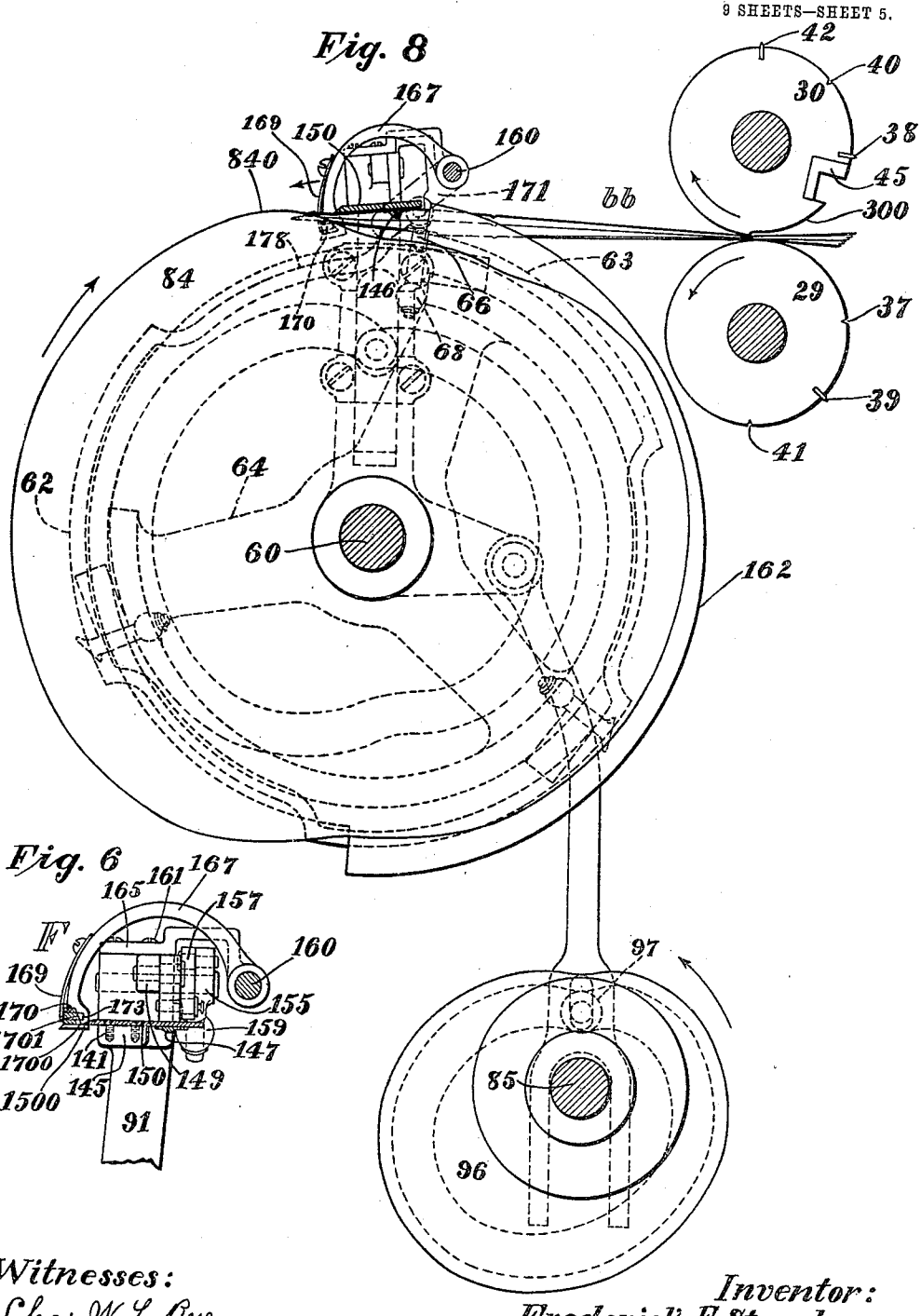

Fig. 6

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9 SHEETS—SHEET 6.

Fig. 9

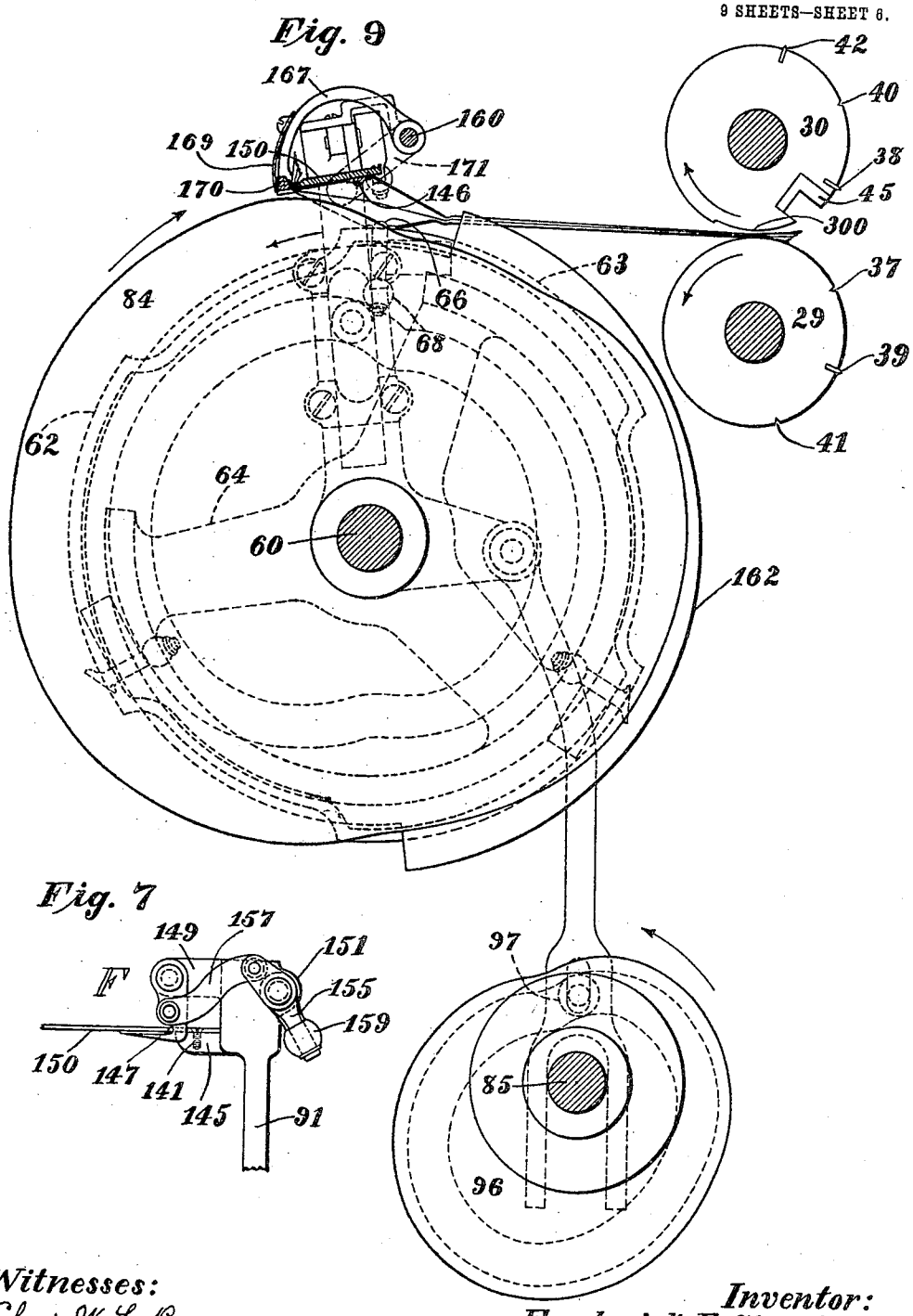

Fig. 7

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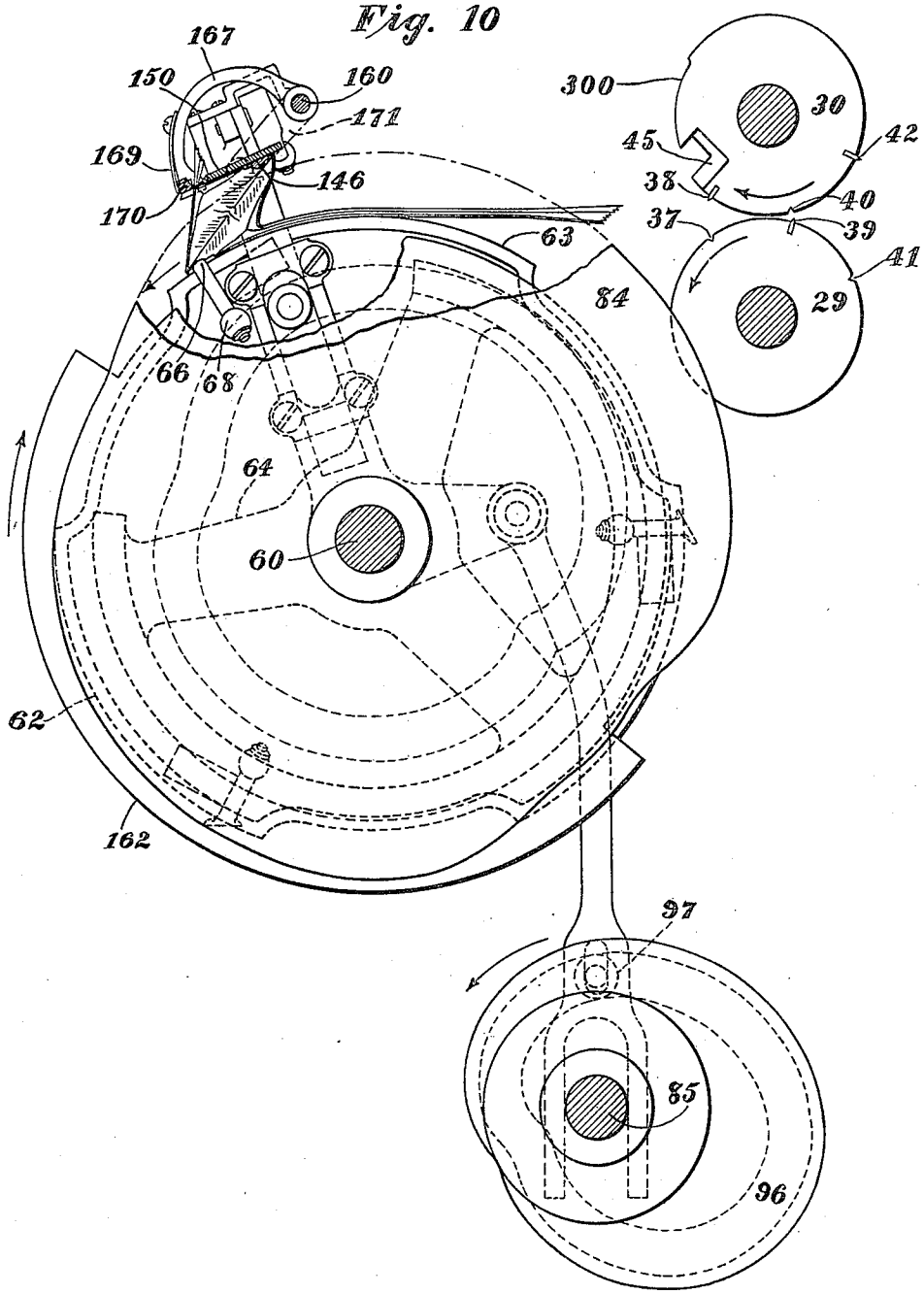
9 SHEETS—SHEET 7.

Fig. 10



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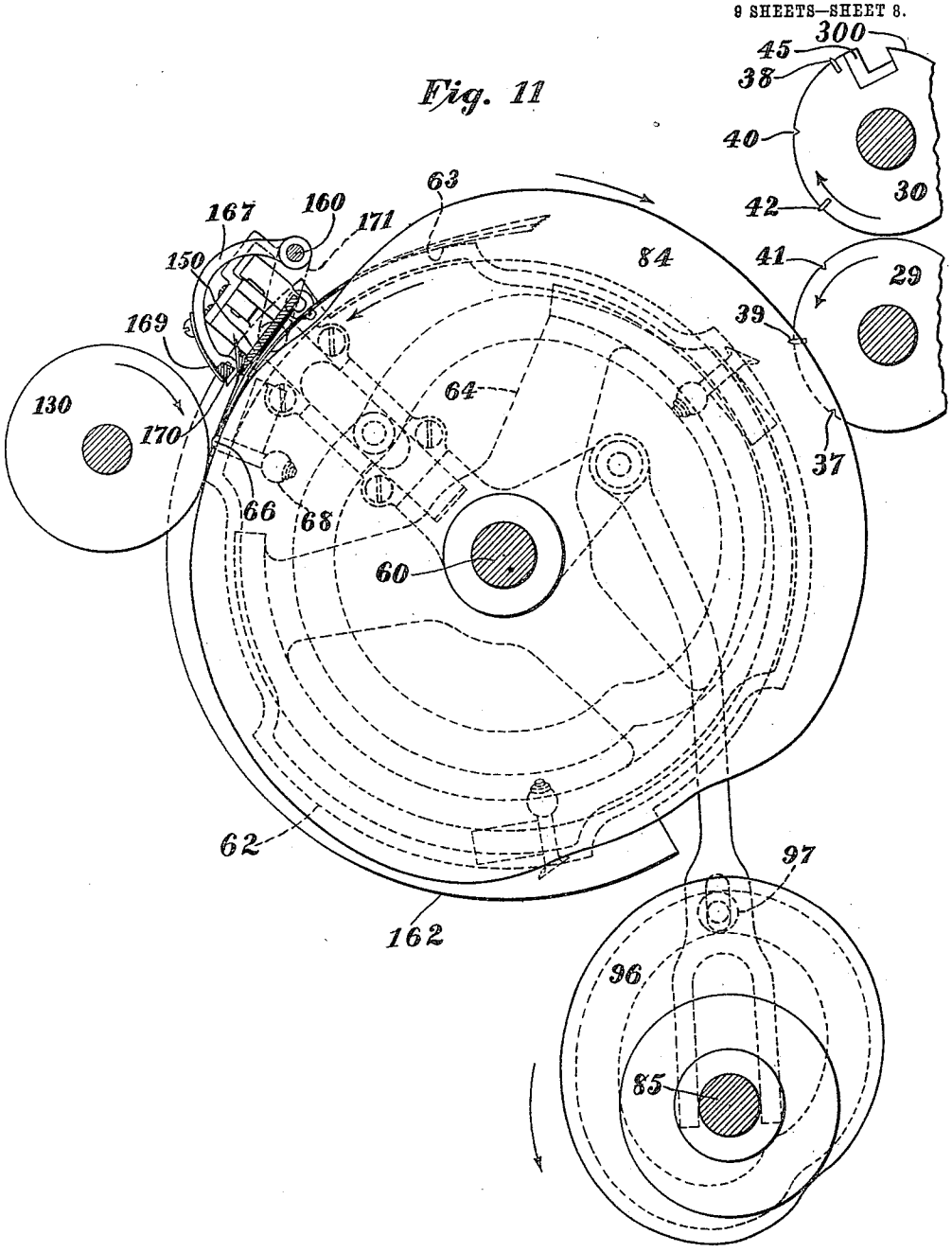
9 SHEETS—SHEET 8.

Fig. 11



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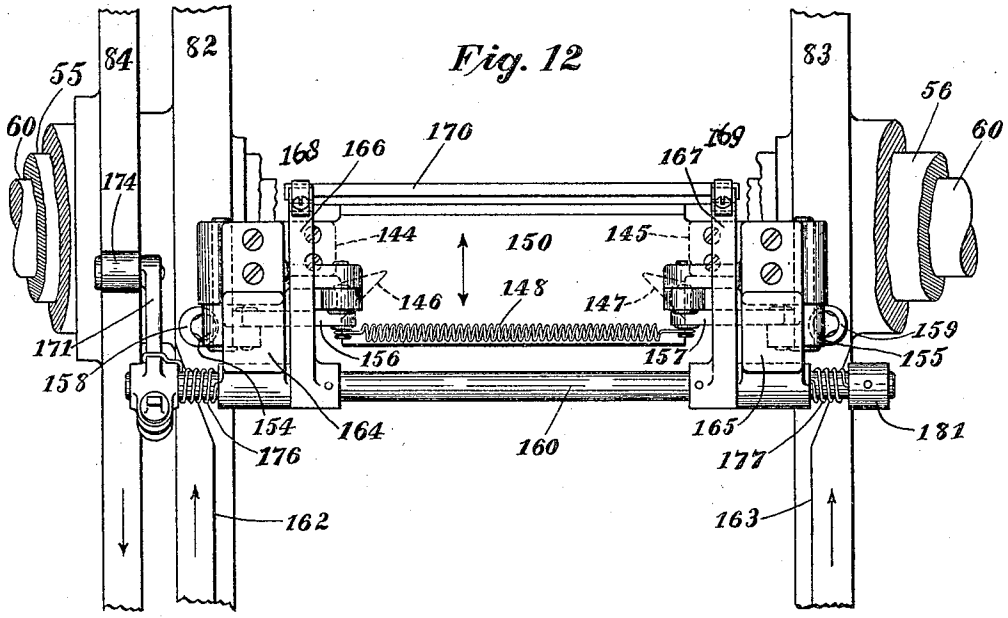
9 SHEETS—SHEET 9.

Fig. 12



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UNITED STATES PATENT OFFICE.

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PAPER-BAG MACHINE.

No. 816,193. Specification of Letters Patent. Patented March 27, 1906.

Application filed March 9, 1905. Serial No. 249,267.

To all whom it may concern.

Be it known that I, FREDERICK E. STRASBURG, a citizen of the United States, residing at Rumford Falls, in the county of Oxford and State of Maine, have invented certain new and useful Improvements in Paper-Bag Machines, of which the following is a specification.

This invention relates to paper-bag machines, and directly to that class of such machines as are adapted to automatically manufacture the commonly-called "collapsed square" paper bag (such as is shown in Figures 12, 13, and 14 of United States Patent to Appel, No. 388,614, of August 28, 1888) from continuous paper tubing having an inwardly-folded tuck in each side thereof.

One embodiment of my invention, and which may be the preferred one, is illustrated in the drawings accompanying this specification, wherein—

Fig. 1 is a side elevation of so much of a paper-bag machine as is necessary to illustrate my invention. Therein sundry small parts of frame, gears, &c., are broken away to better show parts that would otherwise be obscured. Fig. 2 is a plan view corresponding with the elevation of Fig. 1, and in said plan the pasting mechanism is omitted in the interest of clarity. Fig. 3 is a front end elevation, partly in section. The general section is taken on line *a a* of Fig. 1 and looking in the direction indicated by arrow A in that figure. A portion of the parts on the folding-bed axis are also shown in section on line *d d* of Fig. 1. Fig. 4 is a plan view of the pasting mechanism, and Fig. 5 is a side elevation thereof with those parts of the shafts and framing below line *b b* of Fig. 4 removed. Figs. 6 and 7 are side and rear elevations, respectively, of a portion of the bottom-folding mechanism. Fig. 6 is partially in section and which section is taken on line *c c* of Fig. 2 and looking in the direction of arrow C. Figs. 8, 9, 10, and 11 are a series of views illustrating the parts of the bottom-forming mechanism in their successive positions. Figs. 4 to 11, inclusive, are drawn to larger scales, respectively, than Figs. 1 to 3, inclusive. Fig. 12 is a plan view of a portion of the bottom-folding mechanism and corresponds in scale with Figs. 6 and 7.

The general plan followed in the operation of my improved machine is as follows: By suitable means I first form three creases transverse the bag-blank and through all the plies thereof and at about the same time sever a bag-blank section from the tucked-paper tube. The crease nearest the leading end of the bag-blank is at a distance from that end equal to about one-half the depth of a side tuck. The second crease is at a distance from the first crease equal to the depth of a side tuck, and the third crease is an equal distance rearward of the second crease. Continuing, I then grip first the leading end of the bag-blank, including all the plies and across the whole width thereof at a point just in advance of the first crease; secondly, I grip the opposite lower plies of the side tucks just rearward of the second crease; thirdly, and at about the same time, I grip the opposite upper plies of the side tucks just in advance of the second crease. Then by an upward and backward movement of the first and third mentioned gripping means I open out the side tucks, and then by a continued backward movement in connection with a downward movement thereof I fold the distended bottom over and down upon itself on the line of the third transverse crease, thus completing the folding of the bottom.

The improved means which I have provided to perform the aforerecited functions may be mounted in and upon main side frames 2 3 of suitable form, Figs. 1 and 2. At T is shown the delivery end of some suitable tube-forming mechanism, the forward end of which terminates in a float 4, having the usual serrated front edge. Directly above said float and having a serrated front edge a short distance rearward of the serrated edge of the float is knife 5, suitably supported at 6 7 in frames 2 3, respectively. Mounted upon shaft 8 parallel with the direction of travel of the bag-tube is striker 9 for severing in connection with float 4 and knife 5 the bag-tube into bag-blank sections. Frame 3 has a U-shaped opening therein at 390 to allow room for the rotation of the striker. Striker 9 is secured to shaft 8 by the usual set-screws 10 and may be rotated with said shaft in proper time from shaft 11 through gears 12 13. Said shaft 11 is the main driving-shaft of the machine and is mounted for rotation in brackets 14 15 on frames 2 3, respectively. Said shaft is provided with the usual tight and loose pulleys 16 17, respec-

tively, through the tight one of which power may be communicated to the machine by means of the usual belt. The machine may be provided with the usual sliding belt-shifter 20. Shaft 11 has fixed thereon gear 18, which through idle gear 19 drives lower feed-roll gear 21 and thence upper feed-roll gear 22. Feed-rolls 23 24 are mounted upon shafts 25 26, respectively, and which shafts are mounted for rotation in brackets 14 15. Said shafts have also fixed thereon gears 21 22, respectively.

Directly succeeding the severing mechanism is an adjustable table 27, supported by any convenient means for receiving the bag-tube and assisting its leading end into engagement with creaser-rolls 29 30. Said creaser-rolls are mounted upon shafts 31 32, respectively, Figs. 1, 2, and 5, said shafts having their bearings in brackets 33 34, upstanding from frames 2 3, respectively. Roll 29 is driven from gear 21 through idle gear 28, which meshes with gear 35 on shaft 31 of said roll 29. Roll 30 is driven from gear 35, which meshes with gear 36 on shaft 32 of said roll 30. Rolls 29 30 are provided with three pairs of creasers, roll 29 having therein creaser-groove 37, creaser-blade 39, and creaser-groove 41 for coaction, respectively, with creaser-blade 38, creaser-groove 40, and creaser-blade 42 of roll 30. Said rolls may also be provided, if desired, with a slacking device, indicated in a general way by 43 44, to assist the tube-severing means in its operation. In Figs. 1, 2, 4, and 5 creasers 41 42 are illustrated as mounted in said slacking device, or said slacking device may be omitted and creasers 41 42 mounted directly in rolls 29 30, respectively, as shown in Figs. 8 to 11, inclusive. Roll 30 is also provided with a pasting-blade 45, secured in a suitable cavity 47 therein by means of screws 46.

On shaft 32 near bracket 34 is fixed gear 48, which meshes with gear 111 of the pasting device and whereby said pasting device is actuated. The pasting device, Figs. 4 and 5, is mounted upon posts 102 103 of brackets 52 53, respectively. Paste-transfer bar 101 is supported in arms 104 105 on shaft 106, which shaft is mounted for rotation in brackets 108 109, and which brackets are secured to posts 102 103, respectively, by bolts, as 107. Said bolts are also efficient to hold the respective ends of bridge 110 to posts 102 103. Shaft 106, which carries paste-transfer bar 101, has also fixed thereto gear 111 and through which gear the pasting device is actuated from gear 48, as hereinbefore stated. The usual paste-reservoir 112 is mounted upon bridge 110 and secured thereto by bolts, as 113. Said reservoir is provided with a discharge-roll 114, pivotally mounted on shaft 115 in brackets 116 117 on said reservoir. Reservoir 112 is provided with an adjustable mouthpiece comprising shaft 118, flattened at 119 and governed in its movement by lever 120, pinned thereto. Said lever may be locked in adjustment against the base of reservoir 112 by means of clamp-screw 121. Means for rotating roll 114 intermittently are as follows: On roll-shaft 115 is fixed ratchet 122, and adjacent thereto and turning freely on said shaft is rock-arm 123. At one end of said rock-arm is pivoted pawl 124 for engagement with said ratchet, and at the other end of said arm is pivoted pitman 125. Said pitman is adjustably screwed into strap 126 of eccentric 127. Said eccentric is mounted upon and fast to shaft 106. By the rotation of said eccentric arm 123 may be rocked, and through pawl 124 and ratchet 122 a step-by-step rotary movement may be imparted to roll 114. For each rotative step of roll 114 paste-transfer bar 101 makes one revolution about shaft 106 and wipes from said roll a portion of paste for delivery onto pasting-blade 45 of roll 30.

On shaft 31 and at the front end thereof, Fig. 1, is adjustably fixed gear 50 and from which gear the bottom-forming part of the machine is driven. Said gear is secured for rotation with shaft 31 by means of bolts 49, which bolts pass through gears 35 and 50 and in coaction with nuts 51 hold said gears securely together. The bolt-holes in gear 50 are slotted, as at 54, for adjustment.

In brackets 52 53, Fig. 3, upstanding on frames 2 3, respectively, are sleeves 55 56, having flanges 57 58, respectively, and by which flanges said sleeves are secured by bolts, as 59, to their respective brackets. In said sleeves are provided bearings for shaft 60. On this shaft is mounted revoluble carrier 61, having thereon one or more folding-beds, as 62 63, Figs. 1, 2, and 3. Said folding-beds are provided with the usual side clips, as 66 67, having rolls 68 69 thereon, respectively, for engagement with fixed cams 64 65, respectively, for opening said clips. The clips may be closed by the usual springs. (Not shown.) Fixed cams 64 65 are supported on the inner ends of sleeves 55 56, respectively, and secured thereto by set-screws, as 70. On that end of shaft 60 nearer the observer in Fig. 1 is keyed gear 71. Said gear is driven from gear 50 on shaft 31 through idle gear 72. Gear 71 meshes with gear 73 on shaft 74, and between brackets 52 53 on said shaft are fixed gears 76 77, which through idle gears 78 79, respectively, drive gears 80 81, keyed to the sleeve-like hubs of cams 82 83, respectively, and whereby said cams are driven in a direction opposite to the direction of rotation of gear 71 and folding-bed carrier 61 and at a rotative speed as many times greater than that of the gear and carrier as that carrier has folding-beds, which in the present instance is three. Cam 84 is also keyed to the hub of cam 82 and revolves therewith.

On the outboard end of cam-shaft 85, Figs. 1 and 3, is secured gear 86, and which gear is driven from gear 71 through idle gear 87. Said gear 86 is driven in the same direction as gear 71, but at three times the rotative speed thereof. Oppositely disposed for oscillation on sleeves 55 56 and situated between cams 64 82 and 65 83 are rock-arms 88 89, all respectively. Said rock-arms are each of bell-crank shape, one member of each, as 880, reaching upwardly and one member of each, as 808, reaching rearwardly. Upper members 880 and 890 have formed therein suitable bearings in which uprights 90 91, respectively, of folding device F slide. Pivotally connected to the free ends of rear members 808 809 of rock-arms 88 89 are upper ends 94 95, all respectively, of yoke 92. The lower end of yoke 92 is bifurcated at 93 for sliding guidance on shaft 85. On said shaft is fastened cam 96, and yoke 92 is provided with a roll 97 for engagement therewith. By the rotation of cam 96 yoke 92 may be reciprocated vertically and arms 88 89 rocked on sleeves 55 56, respectively. Said roll 97 is mounted on stud 98, and which stud is adjustably secured in a suitable slot in yoke 92 by means of nut 99. The bifurcated end 93 of yoke 92 is prevented from movement lengthwise of shaft 85 by means of cam 96 on one side and collar 100 on the other side.

The bottom-folding device (indicated in a general way by F; best shown in Figs. 6, 7, and 12) is mounted upon uprights 90 91, which uprights are slidably mounted in the upward-reaching members 880 890 of rock-arms 88 89, respectively. Said uprights may be actuated up and down in unison by means of rolls 142 143 thereon in engagement with cams 82 83, turning upon sleeves 55 56, all respectively. Near their upper ends said uprights are provided with inreaching brackets 144 145, respectively, to which the opposite ends of folding-plate 150 are secured by suitable means, such as screws 141. Said folding-plate is movable toward and away from the successive folding-beds, as 62 63, and in approximate parallelism or at a constant angle therewith by means of the upward and downward movement of uprights 90 91, and said folding-plate is oscillatable forwardly and backwardly in space, but always backwardly with respect of those successive folding-beds, by means of the oscillation of rock-arms 88 89 about shaft 60 as an axis. By these means said folding-plate is caused to move during its coaction with the folding-bed in the arc of a circle with respect of that folding-bed—that is, any given line across said folding-plate—as, for instance, the line of its forward edge 1500—rotates about a corresponding line across the folding-bed as an axis, as in the case of said front edge 1500 about the line through the forward edges of side clips 66 67 when those clips are in their closed positions. Folding-plate 150 is provided with the usual side clips 146 147, pivotally mounted on ears, as 149, extending inwardly from uprights 90 91, respectively. Plate 150 is cut away at the ends thereof to allow room for the access of said side clips thereunder. Pivotally mounted in ears, as 151, on said uprights 90 91 are rock-arms 154 155, the upper members of which are linked to side clips 146 147 by links 156 157 and the lower members of which bear rolls 158 159, all respectively. Said rolls are for engagement with cams 162 163, respectively, for opening side clips 146 147. Said cams 162 163 are mounted upon and revolve with cams 82 83, respectively, and which cams make one revolution in coaction with each successive folding-bed. Said side clips are closed by means of spring 148, the opposite ends of which are attached to the opposite side clips, respectively. In brackets 164 165, attached by screws, as 161, to uprights 90 91, respectively, is rock-shaft 160, and fixed to said shaft 160 adjacent to said brackets and reaching over to edge 1500 of folding-plate 150 are arms 166 167, respectively. Said arms are slotted in their free ends at 172 173 for the reception of opposite ends, respectively, of gripper-bar 170. The ends of said gripper-bar are retained in said slots and angled face 1701 and working edge 1700 thereof urged to engagement with edge 1500 of plate 150 by means of springs 168 169 on said arms, all respectively. Shaft 160 is provided with an arm 171, having a roll 174 at the free end thereof for engagement with cam 84 for rocking gripper-bar 170 up and down with respect of folding-plate 150. Said roll 174 is urged to engagement with said cam by means of springs 176 177 on opposite ends of shaft 160. One end of spring 176 is fast to bracket 164 and the other end thereof hooked over arm 171 on said shaft 160. One end of spring 177 is attached to arm 165, and the other end thereof is attached to collar 181 on said shaft 160.

The ironing and delivery mechanism is as follows: Rearwardly reaching and bolted to brackets 52 53 are brackets 152 153, respectively. On shaft 128, mounted in boxes 129 in said brackets 152 153, and which boxes are preferably yieldable, is ironing-roll 130. Said roll coacts with successive folding-beds on carrier 61 to roll down the gummed seal-flap onto the bag-bottom and to roll down and flatten the folded bag-bottom. On roll-shaft 128 is gear 131, meshing with gear 71, and whereby roll 130 is driven. Below roll 130 is a pair of discharge-rolls 132 133. Roll 132 is driven from gear 134 on shaft 128, through idle gear 135, which engages gear 136 on delivery-roll shaft 137. Lower delivery-roll 133 is driven from gear 136, which meshes with gear 138 on lower delivery-roll shaft 139. The completed paper bag is guided into the grip of rolls 132 133 by deflecting-apron 140.

My invention is also applicable to a paper-bag machine having a reciprocating instead of a rotating folding-bed and in which case folding-plate 150 would reciprocate in parallelism therewith and rise and fall as illustrated in the drawings. Also it is obvious that my invention is applicable to a paper-bag machine having a stationary folding-bed either curved or flat.

The operation of my improved machine is as follows: Suitable tucked-paper tubing being supplied to the machine by the delivery end T of the tube-forming mechanism, Figs. 1 and 2, said tube is fed forward by rolls 23 24 past the serrated edges of float 4 and blade 5 and thence over table 27 and into the grip of rolls 29 30, Fig. 5. By means of pasting-blade 45 in roll 30 paste is applied across the forward end of the bag-tube, and by creasers 37 38 in said rolls 29 30, respectively, said bag-tube is creased just rearward of said pasted portion. By the continued revolution of rolls 29 30 the bag-tube has two more transverse creases formed therein by creasers 39 40 and 41 42, respectively. These last creasers are preferably mounted in some suitable slacking device, as 43 44, and while in the grip of said slacker the bag-tube has a bag-blank portion *bb* severed therefrom by striker 9 in coaction with float 4 and knife 5. The pasted, creased, and severed bag-blank is then fed forward by the continued rotation of rolls 29 30 onto one of the folding-beds, as 63, of carrier 61 and under folding-plate 150, hovering thereover, Fig. 8. At this time roll 174 of arm 171 on rock-shaft 160 has reached a low part of cam 84, and gripper-bar 170 has therefore been swung below the face of folding-bed 63 and just forward thereof in depressed portion 178 of carrier 61. The forward end of the bag-blank therefore passes over said bar 170. Side clips 66 67 then grip the lower plies of opposite side tucks, respectively, of the bag-blank to the folding-bed, and directly thereafter or simultaneously therewith side clips 146 147 grip the upper plies of said side tucks, respectively, to the under side of folding-plate 150. The side clips of the folding-bed grip the blank thereto just rearward of the middle transverse crease in said blank, and the side clips of the folding-plate grip the blank to said plate just forward of that middle crease in the blank. The machine at this stage of its operation is shown in Fig. 8 of the drawings. Roll 174 of arm 171 on rock-shaft 160 is now just about to rise toward high part 840 of cam 84 as that cam continues its anticlockwise rotation about axis 60. This upward movement of said roll causes gripper-bar 170 to be moved upwardly, and the flat angled face 1701 thereof bends upwardly the forward end of the bag-blank, and thereafter edge 1700 of that gripper-bar grips said blank on the line of its forward crease to edge 1500 of folding-plate 150. Said gripper-bar is thereby thrust backward a slight amount in slots 172 173 of arms 166 167 against the pressure of springs 168 169, all respectively. During this movement of gripper-bar 170 folding-plate 150 has started on its upward movement to distend the side tucks, and said plate then commences a corresponding slowing down in its forward movement. Throughout the remainder of said forward movement of folding-plate 150 that plate and gripper-bar 170 maintain the same positions in relation to each other, Figs. 9 and 10. Folding-plate 150 continues its upward movement and continues to decrease its rate of forward movement, thereby allowing folding-bed 63 to run ahead of it. Said plate continues to so move through the position of Fig. 9 and nearly to that of Fig. 10 and at which last point said plate has reached its highest position relative to the folding-bed. Still continuing its decreased rate of forward movement, said plate now commences to move downwardly, Fig. 10. The upward and downward movement, on the one hand, and the retarded forward movement, on the other hand, both relative to the folding-bed, are so timed in their relation to one another as to always maintain the same distance between edge 1500 of the folding-plate and the forward edges of the lower side clips, whereby the sides of the bag-bottom are held taut during the formation of the side folds of the bottom. In other words, the path of edge 1500 of plate 150 conforms to an arc of a circle whose center is coincident with a line through the forward edges of side clips 66 67, respectively, as though that edge 1500 was pivoted in line with the forward edges of those side clips. Folding-plate 150 continues its downward and retarded forward movement from the position of Fig. 10 to the position of Fig. 11, in which latter position the folding-plate side clips have been swung out of operation, the folding-plate has completed its forward movement, and gripper-bar 170 has moved upwardly from engagement with edge 1500 of the folding-plate, thus freeing the folded bag-bottom from engagement with the folding-plate and its appurtenances. Said folded bag is still gripped by side clips 66 67 to the folding-bed and is thereby carried under ironer-roll 130. When the leading end of the bag is well under said roll, side clips 66 67 release their hold thereon, and the pasted flap of the bag-bottom is pressed down upon that bottom and the bag ironed into its final form. The finished bag then moves over deflecting-apron 140 and into the grip of delivery-rolls 132 133, by which it is delivered to some suitable drying device. (Not shown.)

I claim—

1. The combination of a revoluble folding-bed, a folding-plate above the folding-bed, side clips on each, means for operating the side clips, means for gripping a bag-blank to

the forward edge of the folding-plate, means for oscillating the folding-plate about the axis of the folding-bed with the face of the folding-plate in substantial parallelism with the folding-bed, and means to move the folding-plate up and down with respect of the folding-bed in coaction with the oscillation of said folding-plate.

2. The combination of a folding-bed, a folding-plate above the folding-bed, side clips on each, means for operating the side clips, a gripper-bar yieldably supported on the folding-plate, means for moving the gripper-bar up and down with respect of the folding-plate and in coaction with the forward edge thereof, means for moving the folding-plate up and down and backward with respect of the folding-bed while maintaining the forward edge of said folding-plate at a constant distance from a given line across the folding-bed.

3. The combination of a revoluble folding-bed 63, a folding-plate 150 above the folding-bed and oscillatable about the axis thereof, side clips on the folding-bed and on the folding-plate, means for operating the side clips, a gripper-bar 170 oscillatable up and down with respect of the folding-plate, means to oscillate the gripper-bar and means for moving the folding-plate in the arc of a circle with respect of the folding-bed.

4. The combination of a folding-bed, a folding-plate above the folding-bed, side clips on each, means for operating the side clips, a gripper-bar pivotally mounted on the folding-plate for engagement with the forward edge thereof, means for moving the gripper-bar up and down with respect of the folding-plate and means for moving the folding-plate up and down and backward with respect of the folding-bed and with the face of the folding-plate in substantial parallelism therewith and with the forward edge of the folding-plate at a constant distance from a given line across the folding-bed.

5. The combination of a revoluble folding-bed having side clips thereon, a folding-plate having side clips thereon, means for operating the side clips on the folding-bed and on the folding-plate, means for gripping the bag-blank to the forward edge of the folding-plate and means for moving the folding-plate backward and upward and then backward and downward with respect of the folding-bed and with the face of the folding-plate in substantial parallelism therewith, and with the forward edge of the folding-plate always at a predetermined distance from a given line across the folding-bed.

6. The combination of a folding-bed, means to grip the lower plies of a bag-blank thereto, a folding-plate above the folding-bed and means to grip the upper plies of a bag-blank thereto, means to grip the bag-blank to the forward edge of the folding-plate and means to move the folding-plate backward with respect to the folding-bed while maintaining a substantially equal distance between the forward edge of the folding-plate and a given line across the folding-bed, all combined and operating together substantially as described.

7. The combination of a folding-bed, means to grip the lower plies of a bag-blank thereto, a folding-plate above the folding-bed, means to grip the upper plies of a bag-blank thereto, means to grip the bag-blank to the forward portion of the folding-plate and means to cause the folding-plate to travel in the arc of a circle with respect of the folding-bed all combined and operating together substantially as described.

8. The combination of a folding-bed, a folding-plate above the folding-bed, oppositely-disposed side clips on each, means for operating the side clips, means for gripping a bag-blank to the forward portion of the folding-plate and means for moving the folding-plate to cause its front edge to travel in the arc of a circle about a given line across the folding-bed as an axis while maintaining the face of the folding-plate at a constant angle with the folding-bed.

FREDERICK E. STRASBURG.

Witnesses:
THOS. HAWLEY,
HAROLD SMITHWICK.