

(No Model.)

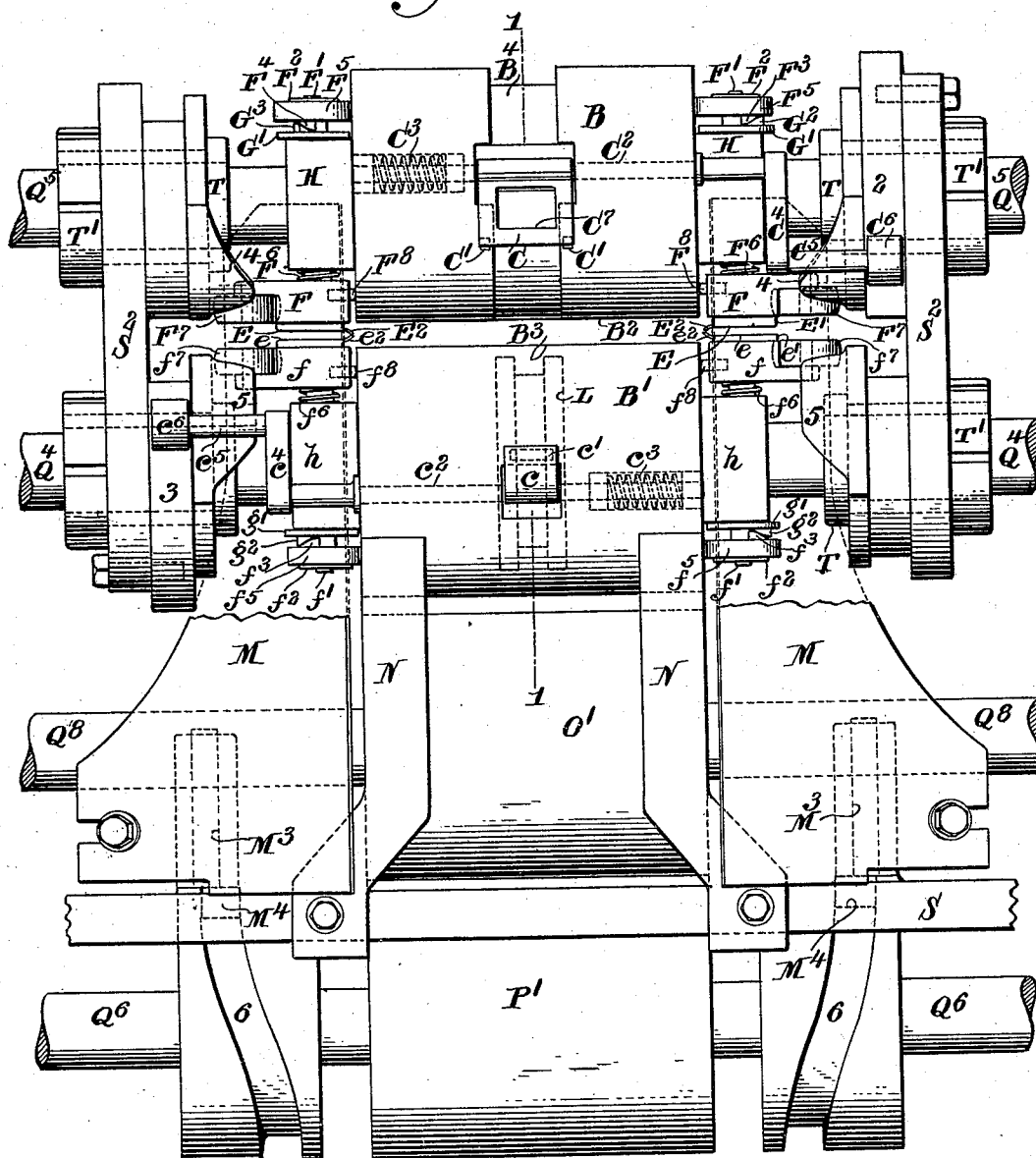
7 Sheets—Sheet 1.

C. E. DULIN.
PAPER BAG MACHINE.

No. 578,550.

Patented Mar. 9, 1897.

Fig. 1.



Witnesses.

Henry Damp
of
Newcastle

Inventor.

Charles E. Dublin

Yours truly,
Wm. F. Chambers

his Attorney.

(No Model.)

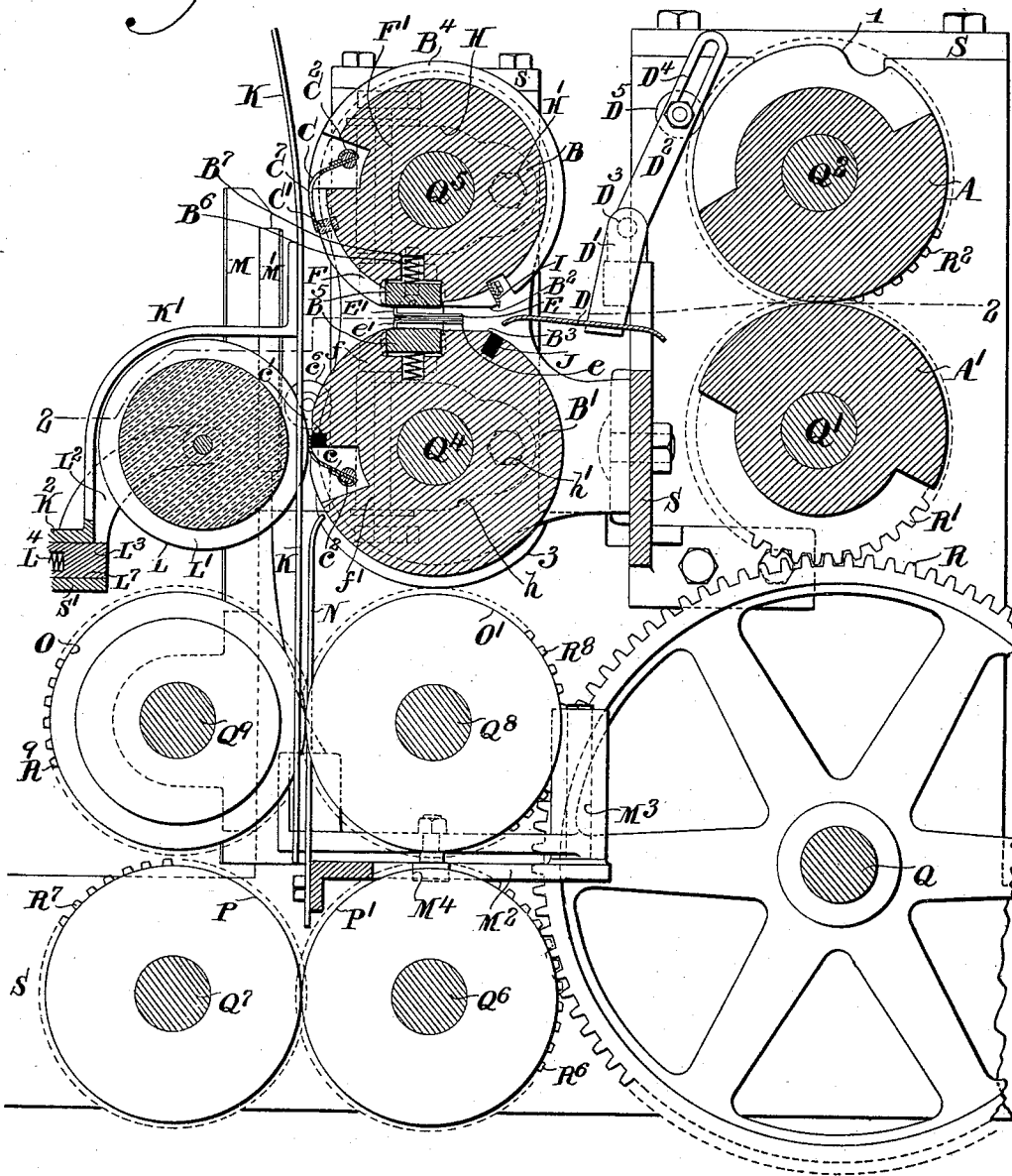
7 Sheets—Sheet 2.

C. E. DULIN.
PAPER BAG MACHINE.

No. 578,550.

Patented Mar. 9, 1897.

Fig. 2.



Witnesses.

Henry Dimp
D. Havert

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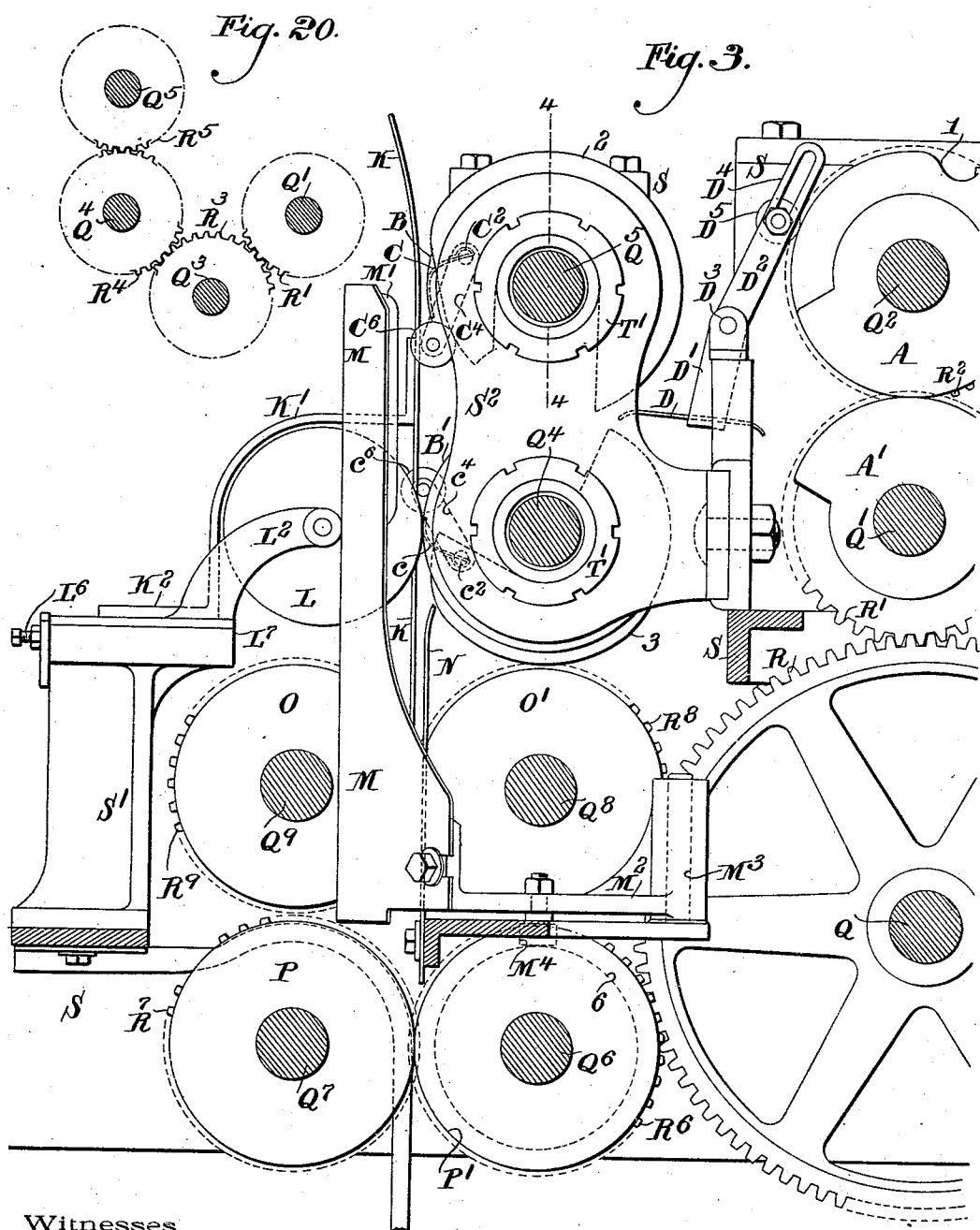
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C. E. DULIN.
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No. 578,550.

Patented Mar. 9, 1897.



Witnesses.

Henry Dwyer
Robert

Inventor.

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(No Model.)

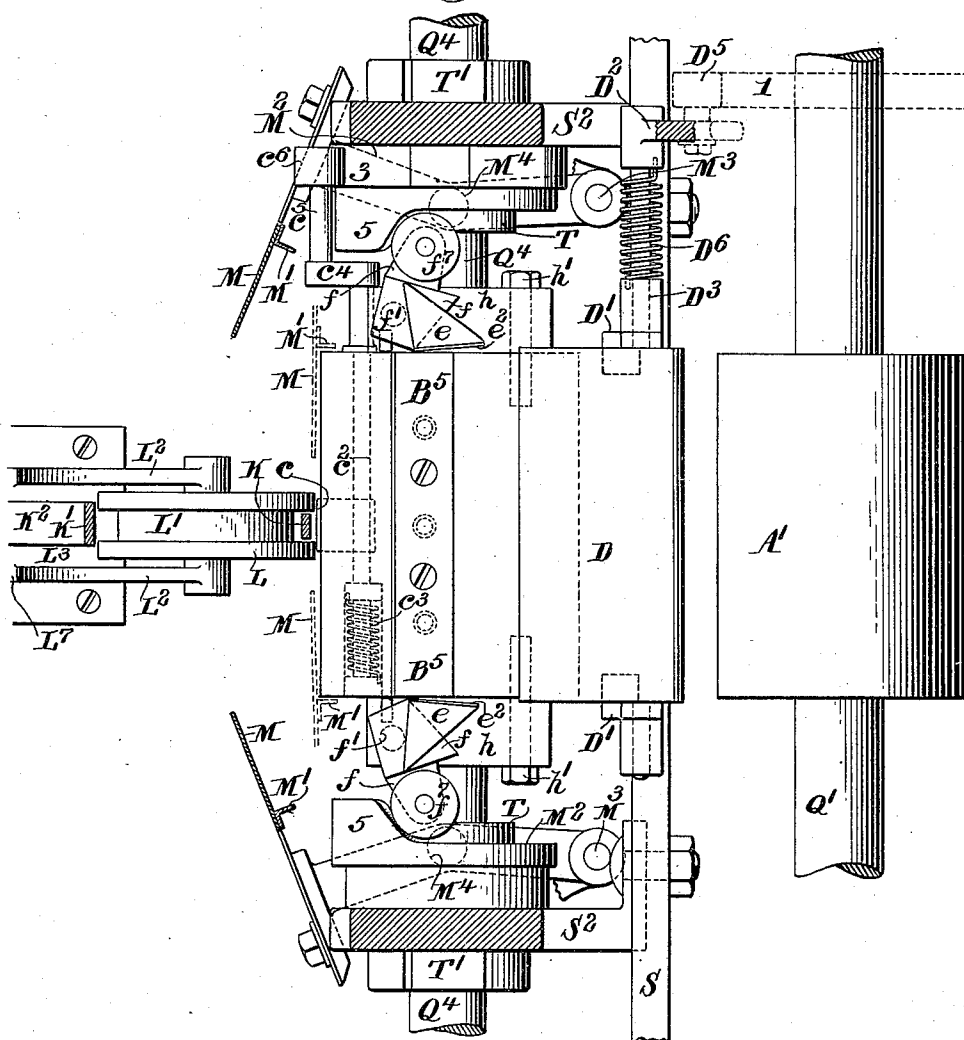
7 Sheets—Sheet 4.

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No. 578,550.

Patented Mar. 9, 1897.

Fig. 4.



Witnesses.

Harry Dwyer
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by
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his Attorney.

(No Model.)

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C. E. DULIN.
PAPER BAG MACHINE.

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Patented Mar. 9, 1897.

Fig. 5.

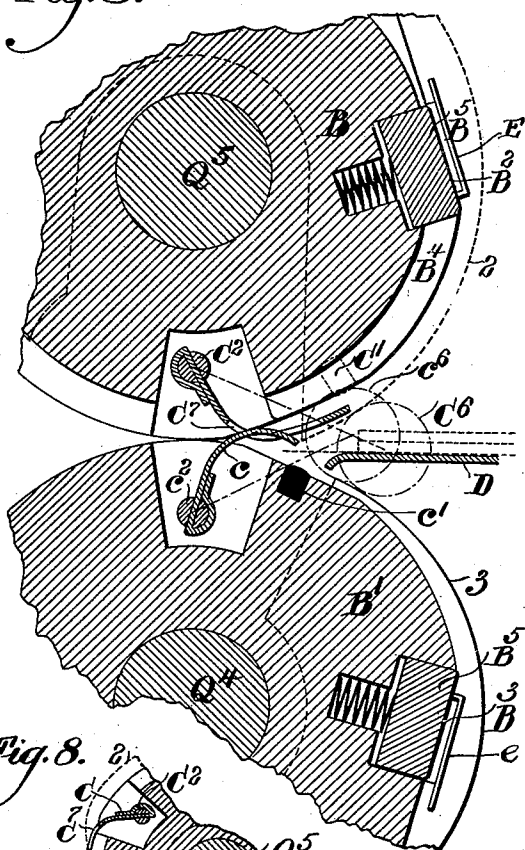


Fig. 6.

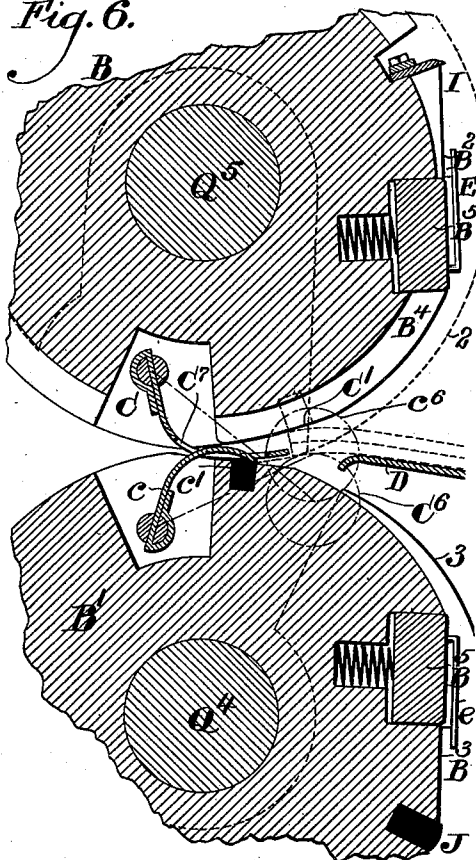


Fig. 8.

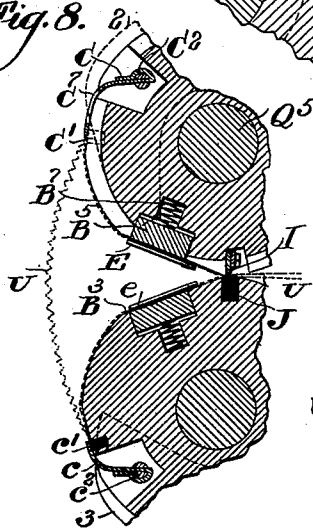
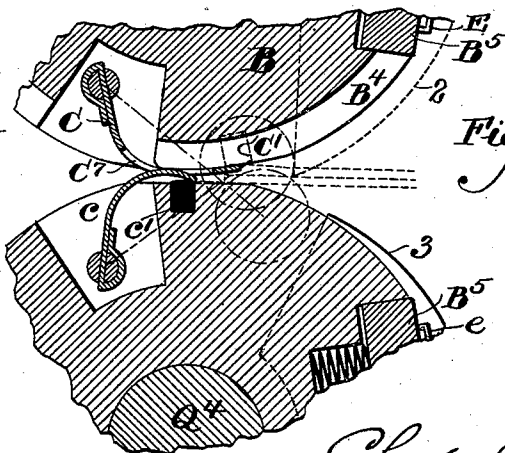


Fig. 7.



Witnesses.

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Frederic F. Chambers

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C. E. DULIN.
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Fig. 9.

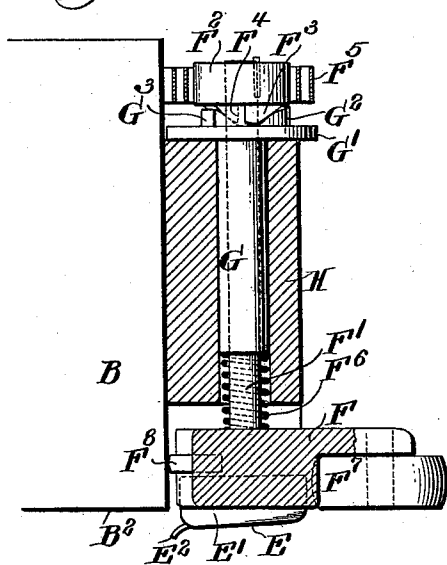


Fig. 12.

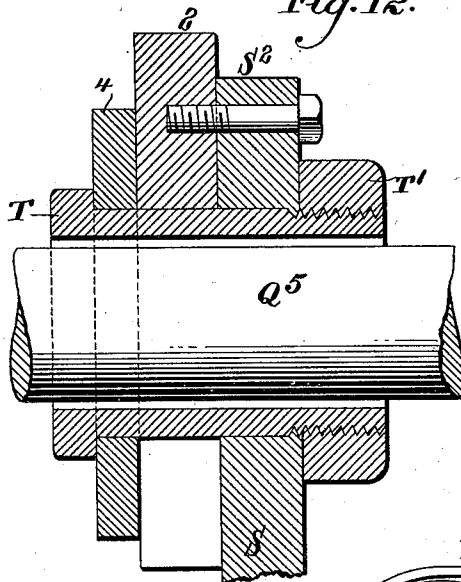


Fig. 10.

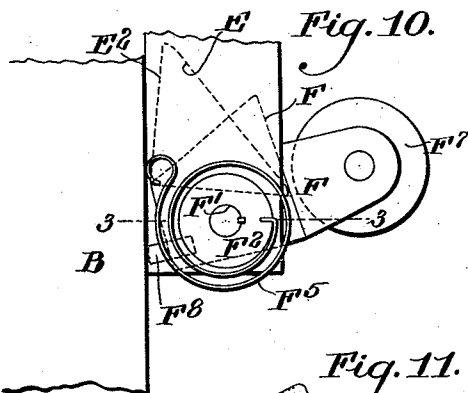


Fig. 13.

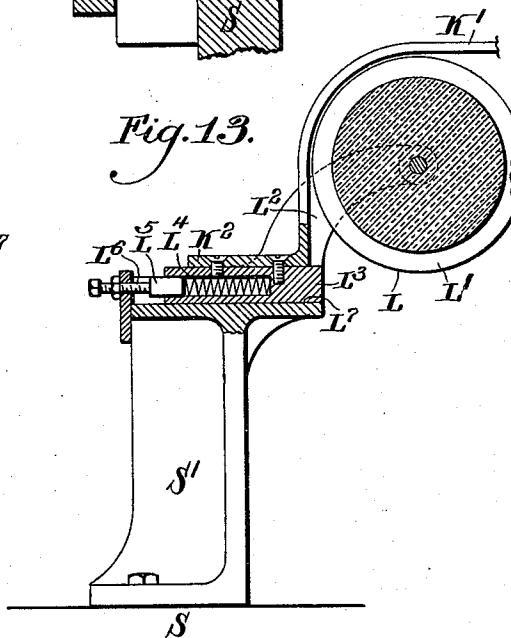
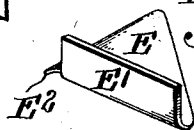


Fig. 11.



Witnesses.
Henry D. Duff
D. Stewart

Inventor.
Charles E. Dulin
by
Frederic T. Chambers
his Attorney.

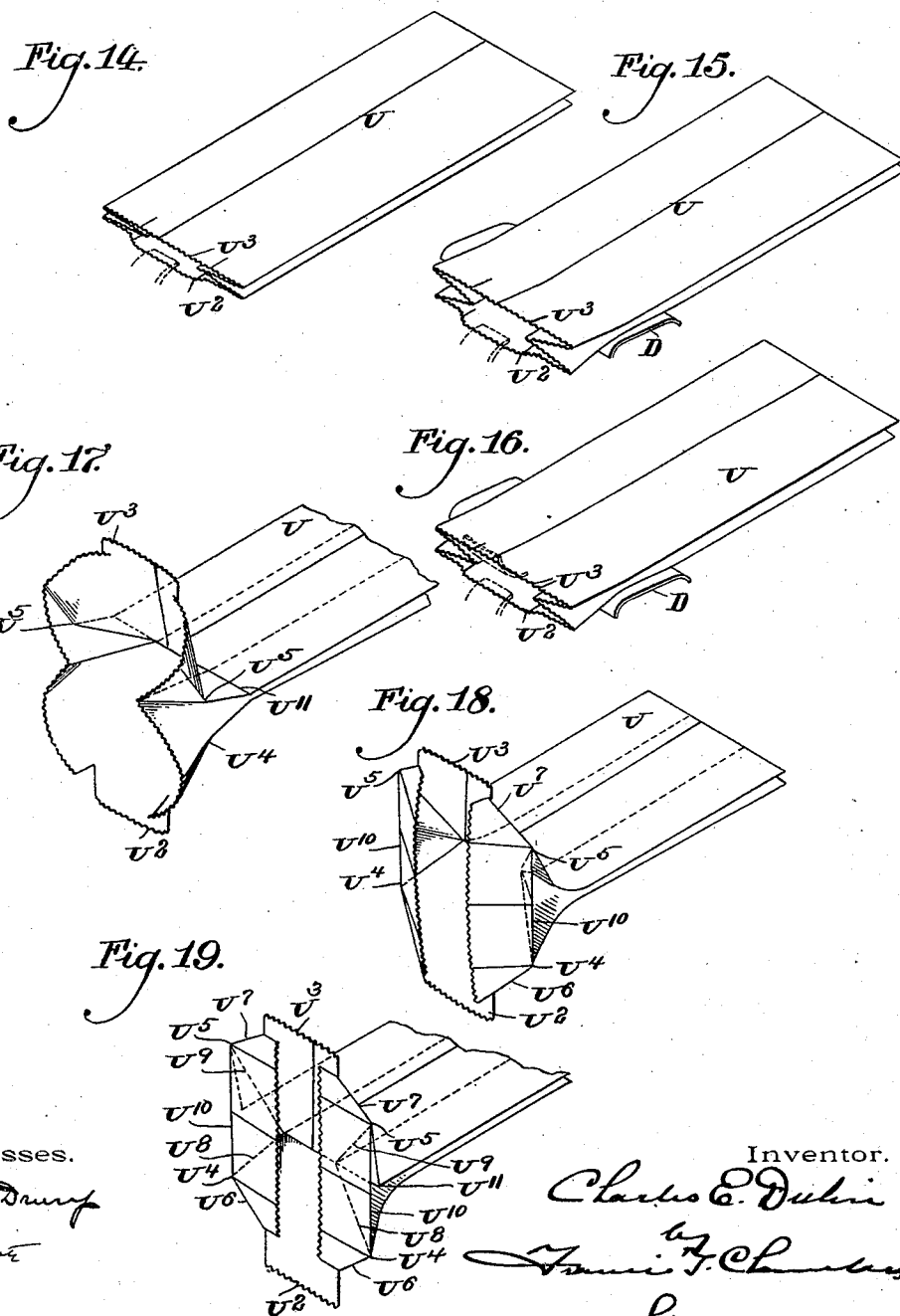
(No Model.)

7 Sheets—Sheet 7.

C. E. DULIN.
PAPER BAG MACHINE.

No. 578,550.

Patented Mar. 9, 1897.



Witnesses.

Henry Dwyer
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Inventor.

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by
James F. Charles
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UNITED STATES PATENT OFFICE.

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PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 578,550, dated March 9, 1897.

Application filed April 4, 1893. Serial No. 586,160. (No model.)

To all whom it may concern:

Be it known that I, CHARLES E. DULIN, a citizen of the United States, residing in the city and county of Philadelphia, in the State of Pennsylvania, have invented a certain new and useful Improvement in Paper-Bag Machines, of which the following is a true and exact description, reference being had to the accompanying drawings, which form a part of the specification.

My invention relates to machinery for manufacturing paper bags, and particularly to machinery to make what is known as the "square satchel-bottom bag," that is to say, a bag made from a bellows-folded tube with a satchel bottom formed upon its end.

The object of my invention is particularly to provide machinery whereby the square satchel-bottom bag may be made with greater speed than has heretofore been practicable, and also I aim at materially simplifying the machinery required for the manufacture of these bags.

The nature of my improvements will be best understood as described in connection with the drawings in which they are illustrated, and which show that portion of a paper-bag machine by which a bellows-folded tube has its end spread out into the form known as the "diamond fold," and I will here say that my present invention is entirely concerned with this part of the machine, which may be used with any convenient mechanism for forming the tubes and for folding the diamond in order to close the bottom of the bags.

In the drawings, Figure 1 is a front view of the machine; Fig. 2, a side elevation, partly in section, on the line 1 1 of Fig. 1; Fig. 3, a side elevation not in section; Fig. 4, a plan view taken on the section-line 2 2 of Fig. 2. Figs. 5 to 8 are sectional views showing the revolving grippers, rolls, &c., in various positions with reference to a bag-blank. Fig. 9 is a view, on an enlarged scale, of the end of one of the rollers and of the mechanism for actuating one of the side grippers, the view being taken on the section-line 3 3 of Fig. 10. Fig. 10 is a plan view of the mechanism illustrated in Fig. 9; Fig. 11, a perspective view of the side gripper itself. Fig. 12 is a sec-

tional view taken on the line 4 4 of Fig. 3. Fig. 13 is a sectional view taken on the line 1 1 of Fig. 1, showing the roller L and mechanism connected with this roller which is omitted in Fig. 2. Figs. 14 to 19 are perspective views of a bag-blank, illustrating the various operations performed upon it by my mechanism. Fig. 20 is an elevation of some of the gearing omitted for the sake of clearness in the side elevations of Figs. 2 and 3.

A and A' indicate segmental rollers through which the bellows-folded tubes pass on their way to the mechanism by which the diamond fold is distended.

B and B' indicate a coacting pair of rolls between which the blanks pass and to which in the arrangement illustrated the various grippers, &c., which coact in the distention of the diamond fold are secured. In the construction illustrated, these rollers are each formed with flat faces, (shown at B² and B³), upon which flat faces the side grippers operate, but I will here note that it is not essential that the roll should be flat, as indicated, and the grippers may work in connection with the rounded surface of the roll.

The upper roll B is shown as formed with a central peripheral slot B⁴, the function of which is to give clearance to the central gripper of the lower roll, but, as will readily be seen when the machine is understood, this slot need extend no farther than is required for the clearance desired, and while I prefer to so construct and operate the grippers that this clearance will be necessary it is obviously possible to close the lower gripper slightly in advance of the point where it now closes, in which case this central groove upon the upper roller may be dispensed with. Instead of having such grippers engage directly with the face of the rolls, whether flattened, as shown, or rounded, I prefer to provide each of the rolls with a resilient plate or section, such as are indicated at B⁵ B⁵. As shown, the flattened faces of the rolls are recessed and plates B⁵ set into these recesses, which are pressed outward by means of springs B⁷ and held flush or substantially flush with the surface of the roll by screws B⁶. These resilient sections enable the side grippers herein-after described to act with greater certainty

and with more uniform pressure than would be the case if they always gripped the papers against the hard unyielding surface of the rolls or against any hard unyielding surface.

5 C and *c* indicate, respectively, the upper and lower central grippers, which, as shown, are secured to the upper and lower rolls B and B' and rotate with these rolls.

C' *c'* indicate the portion of the rolls or faces 10 attached to the rolls upon which the grippers C and *c* close.

C² and *c*² indicate rods to which the grippers are attached and which rods are pivotally supported in rolls B and B', C³ and *c*³ indicating 15 springs acting on the shafts C² and *c*², so as to hold the grippers open.

C⁴ *c*⁴ are crank-shafts on the ends of the shafts C² and *c*², to the ends of which crank-arms are attached cam-rollers C⁶ *c*⁶, C⁵ and 20 *c*⁵ being, so to speak, crank-pins upon which these rollers are secured. The opening and closing of the central grippers is effected by the cams 2 and 3, against which the cam-rollers C⁶ and *c*⁶ run, and the outline of which 25 cams is such as will cause the central grippers to engage and disengage the blank, as will be hereinafter described.

The upper gripper C is made considerably broader than the lower gripper *c* and is formed 30 with an opening or slot C⁷ of such breadth and dimensions as will permit the gripper *c* to pass up through it, as is shown, for instance, in Figs. 5 and 6.

D, Figs. 2, 3, and 4, is a lifting device situated between the rolls A A' and B B' and lying 35 beneath the plane along which the bag-blanks pass from the one pair of rolls to the other. It is secured, as shown, upon lever-arms D' D', which in turn are secured to a pivot-shaft D³, from which shaft extends a lever-arm D², to 40 the end of which is secured a cam-roller D⁵, the cam-roller in the design shown (see Figs. 2 and 3) being adjustable in a slot D⁴ in the end of the arm D².

D⁶, Fig. 4, is a spring acting on the shaft D³ 45 in such a way as to tend to raise the lifter D, or to hold the cam-roller D⁵ in contact with the surface of the cam 1, which cam is so formed as to throw the lifter D slightly upward against the bag-blank passing over it 50 once in each revolution of the rolls.

E E *e e* are the side grippers. As shown, the grippers proper are made up of steel plates (see Figs. 9, 10, and 11) the operative 55 ends or edges of which (indicated at E²) are preferably curved downward from the plane of the plate, so that the paper is actually pressed against the roll by the part of the gripper-plate immediately in the rear of the 60 curved edge E². Another edge E' of the plate is turned upward as a means for securing the plate to the gripper-holder F. This holder or block F is secured on the end of a pivoted pin F', which turns freely in a block H, secured at each end of the roll, or, rather, in 65 the construction shown in Fig. 9 the pivot-pin turns in a tube G, inserted in the block

H and having a head G', resting upon one end of the block. The pivot-pin F' in the construction shown has an enlarged head F², 70 from which extend cams F³ and F⁴, which rest against cam-surfaces G² and G³, extending out from the head G'.

F⁵ is a spring acting on the pivot-pin F' in such a way as to throw and hold the gripper 75 E in its outermost or non-operative position.

F⁶ is a spring acting against the holder or block F and tending to push it downward, as shown, and F⁷ is a cam-roller secured on a projecting arm of the holder F. The cam-rollers marked F⁷ and belonging to the grippers 80 secured to the roll B run against cams 4 4, while the corresponding rolls *f*⁷ *f*⁷, connected with the lower roll B', operate in connection with the cams 5 5. (See Fig. 1.) 85

I is a creasing-blade operating, as shown, in connection with a pad J, the blade I being secured to the roller B and the pad J to the roller B', and the position of these parts being such that they will come in contact with 90 the tubular blank as it passes between the rolls B and B' and crease it on the line about which the diamond fold is spread open. While it is convenient to place this transverse creasing device upon the rolls B and B', 95 the essential feature of its use is that some creasing device should be provided which will form the transverse crease at the point referred to some time in advance of the distention of the tube in the formation of the 100 diamond fold, and any creasing device may be used for this purpose.

The features above referred to comprise those which embody the essential novelties 105 of my invention.

The devices which I will now proceed to indicate do not differ to any very essential extent from those in common use with other machines, although these parts have been 110 somewhat modified and changed to adapt them for use in connection with my devices.

K is a rod or plate lying in front of the rolls B and B' and extending down between the feed-rolls O and O'.

L is a gripping-roller lying in front of the 115 roller B' and grooved at L' to permit the passage of the plate K. This roller is supported on arms L², extending out from a slide L³, which slide moves in a guide L⁷ and is thrust out by the action of a spring L⁴, acting against 120 the end of a plunger L⁵, the position of which is adjusted by set-screw L⁶, working in a threaded flange of the standard S', in which the guides L⁷ are secured. The sliding bar 125 L³ serves also to support a plate K², from which extends the curved arm K', which supports the plate K.

It will be readily seen that the action of the spring D⁴ is to thrust the roller L against the face of the roller B' and with a pressure 130 which can be regulated by the set-screw.

M M are wing-folders lying in front of the rolls B and B' and secured on the ends of levers M², pivoted to the frame of the machine

at M^3 and provided with cam-rolls M^4 , which run in the grooves of cams 6 6, the throw of the wing-folders being from the position shown in full lines in Fig. 4 to the position shown in dotted lines in the same figure. These wing-folders are devices in common use, but I have added to the wing-folders projecting plates $M' M'$, which, when the wing-folders close down to the position indicated in dotted lines in Fig. 4, are distant from each by just about the breadth of the bag-blank, so that they hold and guide the blank between them. This is a feature which is new with me and which is of some importance in the operation of my machine.

$N N$ (see Figs. 1, 2, and 3) are stationary plates lying below, but substantially flush with, the front of the roller B' and against which the blanks are pressed by the wing-folders.

O and O' are a pair of feed-rolls, as are also P and P' .

Q is the main driving-shaft of the part of the machine indicated and carries the main driving-pinion R . This pinion engages the pinion R' on the shaft Q' , to which shaft is secured the segmental roller A' , and the pinion R' engages the pinion R^2 , secured to the shaft Q^2 , to which last-mentioned shaft are secured the segmental roller A and the cam 1. From the pinion R' motion is conveyed through an intermediate gear R^3 (see Fig. 20) to the pinion R^4 , secured to the shaft Q^4 , to which shaft is secured the roller B' . The pinion R^4 engages the pinion R^5 , secured to the shaft Q^5 , to which shaft is secured the roller B . The pinion R also engages with pinions R^6 and R^8 , secured on the shafts Q^6 and Q^8 , to which shafts are secured the feed-rolls P' and O' , and the pinions R^6 and R^8 each engage in turn with the pinions R^7 and R^9 , secured on the shafts Q^7 and Q^9 , to which shafts are secured the feed-rolls P and O .

S indicates the frame of the machine, for the most part omitted in the drawings to avoid unnecessary complication.

S' is a standard the position and function of which have already been explained, and S^2 S^2 are plates or standards secured to the frame and through which pass the shafts Q^4 and Q^5 , the openings being made large enough for the insertion of a headed sleeve T , (best shown in Fig. 12,) between the head of which sleeve and the face of the plate S^2 are clamped the cams by which motion is imparted to the central and side grippers, thus, in the case illustrated in Fig. 12, cams 2 and 4, T' indicating a nut by which a headed sleeve is clamped to the plate S^2 .

U indicates the bellows-folded bag-blank, which is illustrated (see Fig. 14) as having a tab on the lower ply (indicated at U^2) and extending farther forward than the corresponding edge or tab U^3 of the upper ply of the blank. On these bag-blanks or bellows-folded tubes the transverse crease about which the diamond is spread open is indicated

at U^{11} , the corners engaged by the side grippers are indicated at $U^5 u^5$ and $U^4 u^4$, while the fold-lines into which the paper folds under the action of my mechanism are indicated by the symbol U and various numerical exponents.

The operation of the machine is as follows: The bag-blanks passing from the feed-rolls A and A' are delivered between the rolls B and B' , the projecting tab U^2 being delivered so that it will lie upon the gripper-bar c' of the roll B' , as indicated in Fig. 5, both grippers C and c being at this time raised and the gripper c lying in the groove C^7 of the gripper C and in the groove B^4 of the roll B . Then as the rolls and grippers move from the position indicated in Fig. 5 to that indicated in Fig. 6 the gripper c is actuated by the cam 3, so that it closes down and engages the tab U^2 , and just about at this time the cam 1, rotating with the shaft Q^2 , causes the lifter D to rise, as indicated in Fig. 6, lifting the blank, so that the upper tab or edge U^3 will lie against the gripper-bar c' and beneath the end of the gripper C . Then as the rolls revolve from the position shown in Fig. 6 to that shown in Fig. 7 the cam Q causes the gripper C to close down upon the gripper-bar C' , as indicated in Fig. 7, and obviously the further rotation of the rolls B and B' , with their attached central grippers, will result in spreading open the mouth of the bellows-folded blank, the joint action of the two central grippers continuing until the rolls have reached approximately the position shown in Fig. 8 and the bag-blank is distended to about the position shown in Fig. 17. Shortly before reaching this point in the rotation of the rolls the side grippers $E E e e$, which lie normally outside of the path of the blank and on each side of the ends of the rolls, as indicated, for instance, in Figs. 1, 9, and 10, are actuated by the cams 4 and 5, the position at which these cams begin to act upon the cam-rollers F^7 and f^7 being that indicated in Fig. 1 and the grippers being fully thrown into position to engage the corners of the bag-blank and grip them upon the face of the rolls B or B' , or, rather, upon the resilient plates $B^5 B^5$, when the rolls reach the angular position indicated in Fig. 8. The shape of the cams 4 and 5 is such as to hold the side grippers in their closed position upon the blank until their rotation has been sufficient to fully distend the bellows fold and bring it substantially to a straight line, (indicated at U^{10} in Fig. 18,) this joint action of the grippers carrying the blank from the form indicated in Fig. 17 to that indicated in Fig. 18. Having reached this point, the upper grippers $E E$ are rapidly withdrawn, and it will be noticed that the cams 4 4, which actuate these upper grippers, are quite abrupt in shape, so that the upper grippers only remain in engagement with the paper for a very short time and through a small angular movement of the rolls, while the cams 5 5, which oper-

ate the lower set of grippers, have, as indicated, a relatively considerable dwell, and in fact do not release until it has approximately reached the form and position indicated in Fig. 19.

The upper central gripper having released the tab U^3 , preferably before the upper side grippers release the corners U^5 , the upper part of the partially-distended diamond is held in place by the plate K and also by the wing-folders M, which, by the action of the cams 6 6, are moved in while the blank is being distended, having already engaged the sides of the distended diamond before the upper side grippers release and then rapidly close down, pressing the blank against the face of the rolls B and B' and also pressing against the plates N N. The form of the cams governing the motion of the central lower gripper and the lower side grippers is such as to retain their hold upon the paper until it has been engaged between the rolls B' and L and has, as before stated, reached approximately the form indicated in Fig. 19. The blank is then drawn down from between the rolls B and B', passing through the feed-rolls O O' and P P' and between the wing-folders M M and the plates N N, these rolls and pressing devices forming and breaking down the final lines of the diamond fold and delivering the diamond-folded blanks to the mechanism (not shown) which completes the formation of the bottom.

As the wing-folders move into the position indicated in dotted lines in Fig. 4, their flanges M' serve not only to guide the edges of the blank, but to prevent any tendency of the bag-blank to spread, which might happen if not provided against, because the pasted seam on the top of the bellows-folded tube is not, as a rule, dry and permanent before the diamond is completed.

It will be noticed (see Fig. 8) that the transverse creaser I J engages and creases the paper of the blank on the line U^{11} just at the time when it is engaged by the side grippers. The important feature is that this transverse crease U^{11} should be formed before the side grippers have distended the tube to any considerable extent, as in the absence of this crease the folds upon which the diamond is extended would not be likely to fall into proper position.

As the side folders when out of operation project beyond the periphery of the rolls to which they are attached and with reference to each other each projects beyond the circle through which the other rotates, it is obvious that they will come in contact as they approach each other in coming to the position where they engage the blank; but as each of the plates E and e is held in its outermost position, as shown in Fig. 9, by the action of the spring F^6 the result of their pressing against each other will simply be to thrust the pivot-pin F' upward, thus permitting them to pass and come to the position indicated in

Fig. 2, the spring F^6 forcing them back to normal position as soon as they leave contact with each other.

While I have shown and above described the central and side grippers, as well as the transverse creaser, as secured to the rolls B and B', it is obvious that these rolls, besides serving as supports for the grippers and creaser, serve merely as feed-rolls; and it is also obvious that by providing any other convenient feeding apparatus the use of the rolls B and B' as such could be dispensed with, the essential feature of my invention being the rotating and coacting device for distending the blank to the diamond form in the manner above described, and, as already stated, it is not essential that the transverse creaser should revolve on the same or approximately the same center or centers with the grippers or, indeed, that it should be a revolving device at all.

Having now described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. In a paper-bag machine mechanism for spreading out the diamond fold on the end of a bellows-folded tube comprising rotating central grippers C c arranged to seize the top and bottom plies of the bellows-folded blank and spread it open at its end, rotating side grippers E E e e arranged to pass between the bellows folds of the bag, engage its corners and spread out the blank in the plane of the bottom to be formed thereon, mechanism for engaging and disengaging the grippers and the blank as described and mechanism for drawing the diamond-folded blanks from the path of the grippers after they have released it.

2. In a paper-bag machine mechanism for spreading out the diamond fold on the end of a bellows-folded tube comprising rotating central grippers C c arranged to seize the top and bottom plies of the bellows-folded blank and spread it open at its end, rotating side grippers E E e e arranged to pass between the bellows folds of the bag, engage its corners and spread out the blank in the plane of the bottom to be formed thereon, mechanism for engaging and disengaging the grippers and the blank as described, a transverse creaser arranged to crease the blank on the line about which the diamond is spread open and at a time prior to the distention of the diamond fold, and mechanism for drawing the diamond-folded blanks from the path of the grippers after they have released it.

3. In a paper-bag machine mechanism for spreading out the diamond fold on the end of a bellows-folded tube, comprising rotating central grippers C c arranged to seize the top and bottom plies of the bellows-folded blank and spread it open at its end, rotating side grippers E E e e arranged to pass between the bellows folds of the bag, engage its corners and spread out the blank in the plane of the bottom to be formed thereon, mechanism for engaging and disengaging the grippers and

the blank as described, a rotating transverse creaser arranged to crease the blank on the line about which the diamond is spread open and at a time prior to the distention of the diamond fold, and mechanism for drawing the diamond-folded blanks from the path of the grippers after they have released it.

4. In a paper-bag machine, mechanism for spreading out its diamond fold on the end of a bellows-folded tube consisting of rolls as B and B', between which the bellows-folded blanks are fed in combination with central grippers C and c, one secured to each roll and arranged to seize the top and bottom plies of the blank as it enters between said rolls, side grippers as E E and e e, one pair attached to and rotating with each roll, said grippers being adapted to move in between the rolls and between the bellows folds of the blank and to clamp the blank to the faces of the rolls at its corners and mechanism for operating the grippers to cause them to engage and disengage the blank at proper times.

5. In a paper-bag machine, mechanism for spreading out the diamond fold on the end of a bellows-folded tube consisting of rolls, as B and B', between which the bellows-folded blanks are fed in combination with central grippers C and c, one secured to each roll and arranged to seize the top and bottom plies of the blank as it enters between said rolls, side grippers, as E E and e e, one pair attached to and rotating with each roll, said grippers being adapted to move in between the rolls and between the bellows folds of the blank and to clamp the blank to the faces of the rolls at its corners, mechanism for operating the grippers to cause them to engage and disengage the blank at proper times, and a creaser arranged to crease the blank transversely on the line about which the diamond fold is opened at a time prior to the distention of the diamond.

6. In a paper-bag machine, mechanism for spreading out the diamond fold on the end of a bellows-folded tube consisting of rolls, as B and B', between which the bellows-folded blanks are fed in combination with central grippers C and c, one secured to each roll and arranged to seize the top and bottom plies of the blank as it enters between said rolls, side grippers as E E and e e, one pair attached to and rotating with each roll, said grippers being adapted to move in between the rolls and between the bellows folds of the blank and to clamp the blank to the faces of the rolls at its corners, mechanism for operating the central grippers whereby the lower gripper first engages the lower ply of the blank and the upper gripper afterward engages the upper ply and mechanism for engaging and disengaging the side grippers.

7. In a paper-bag machine, mechanism for spreading out the diamond fold on the end of a bellows-folded tube consisting of rolls, as B and B', between which the bellows-folded blanks are fed in combination with central

grippers C and c, one secured to each roll and arranged to seize the top and bottom plies of the blank as it enters between said rolls, a lifter as D arranged to lift the blank as it enters between the rolls so as to bring its upper ply to position to be engaged by the upper gripper, said grippers as E E and e e, one pair attached to and rotating with each roll, said grippers being adapted to move in between the rolls and between the bellows folds of the blank and to clamp the blank to the faces of the rolls at its corners and mechanism for operating the grippers to cause them to engage and disengage the blank at proper times.

8. In a paper-bag machine, mechanism for spreading out the diamond fold on the end of a bellows-folded tube consisting of rolls, as B and B', between which the bellows-folded blanks are fed in combination with central grippers C and c moving with and acting against the upper and lower roller respectively, mechanism whereby the lower gripper is first closed and then the upper gripper and whereby they are opened after they have opened the end of the blank, a lifter as D arranged to lift the end of the blank after its lower ply has passed beneath the lower gripper and before the upper gripper closes, side grippers as E E e e, one pair attached to and rotating with each roll, said grippers being adapted to move in between the rolls and between the bellows folds of the blank and to clamp the blank to the face of the roll at its corners, mechanism for engaging and disengaging said side grippers and a creaser arranged to crease the blank transversely on the line about which the diamond fold is opened and at a time prior to the distention of the diamond.

9. In a paper-bag machine, mechanism for spreading out the diamond fold on the end of a bellows-folded tube consisting of rolls, as B and B', between which the bellows-folded blanks are fed in combination with central grippers C and c, one secured to each roll and arranged to seize the top and bottom plies of the blank as it enters between said rolls, side grippers, as E E and e e, one pair attached to and rotating with each roll, said grippers being adapted to move in between the rolls and between the bellows folds of the blank and to clamp the blank to the faces of the rolls at its corners, mechanism for operating the grippers to cause them to engage and disengage the blank at proper times, and a creaser as I J secured to rolls B B' in the rear of the side grippers and arranged to crease the blank transversely as described.

10. In a paper-bag machine, mechanism for spreading out the diamond fold on the end of a bellows-folded tube consisting of rolls, as B and B', between which the bellows-folded blanks are fed, said rolls having flattened sides B² and B³, in combination with central grippers C and c, one secured to each roll and arranged to seize the top and bottom plies of the blank as it enters between said rolls, side

grippers as E E and e e, one pair attached to and rotating with each roll, said grippers being adapted to move in between the rolls and between the bellows folds of the blank and to clamp the blank to the flatted faces of the rolls at its corners and mechanism for operating the grippers to cause them to engage and disengage the blank at proper times.

11. In a paper-bag machine, mechanism for spreading out the diamond fold on the end of a bellows-folded tube, comprising rotating side grippers as E E e e adapted to engage the blank at its corners and spread it out on the plane of the bag-bottom to be formed in combination with springs arranged to push and hold the gripper-jaws outward from the face of the rolls said springs being adapted to yield to the pressure exerted by the jaws upon each other as they come together prior to engaging the blank, mechanism arranged to throw the jaws into the bellows folds and down upon the corners of the blank and mechanism for retracting the jaws from the blank after they have spread it out.

12. In combination with the rotating gripper-holding block H, a pivot-pin F' rotatable and longitudinally movable therein, means as cams G² F³ whereby a rotation of pin F' causes it to move longitudinally, a spring as F⁶ tending to force and hold the pin F' in its outermost position longitudinally, a spring as F⁵ tending to force and hold the pin F' in its outermost position angularly, means as a cam for turning the pin in opposition to spring F⁵ and a gripper as E secured to and moving with the pivot-pin as and for the purpose specified.

13. In a paper-bag machine, mechanism for spreading out the diamond fold in the end of a bellows-folded tube, comprising rotating central grippers C c, the gripper C being slotted as shown at C⁷ and the gripper c of such dimensions as to permit it to pass through said slot as the grippers rotate to position to engage the end plies of the blank, in combination with rotating side grippers E E and

e e arranged to engage with the corners of the bellows folds and spread open the blank on the plane of the bottom to be formed thereon.

14. In a paper-bag machine, mechanism for spreading out the downward fold on the end of a bellows-folded tube comprising rolls B B' between which the blanks are fed the roll B being centrally slotted at B⁴ in combination with central grippers C c secured to said rollers, the gripper C being slotted, as shown at C⁷, and the gripper c of such breadth as to permit it to pass into the slots as the rolls rotate to the position where the blank is engaged, and side grippers E E e e secured to the rolls and arranged to engage the corners of the bellows-folded blank and spread it out on the plane of the bottom to be formed.

15. In a paper-bag machine, mechanism for spreading out the diamond fold on the end of a bellows-folded tube comprising rolls B B' between which the blanks are fed, the roll B being centrally slotted at B⁴, in combination with central grippers C c secured to said rollers, the gripper C being slotted as shown at C⁷, and the gripper c of such breadth as to permit it to pass into the slots as the rolls rotate to the position where the blank is engaged and mechanism as specified for engaging and disengaging said grippers whereby the gripper c first acts to engage the lower ply of the blank and the gripper C then engages the upper ply.

16. In a paper-bag machine, mechanism for spreading out the diamond fold on the end of a bellows-folded tube comprising rolls B B', central and side grippers revolving with said rolls and operating to distend the blank as described, in combination with wing-folders M M operating to press the blank against the face of the rolls and having flanges M' M' arranged to guide the edges of the blank and prevent undue strains on its pasted seam.

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Witnesses:

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