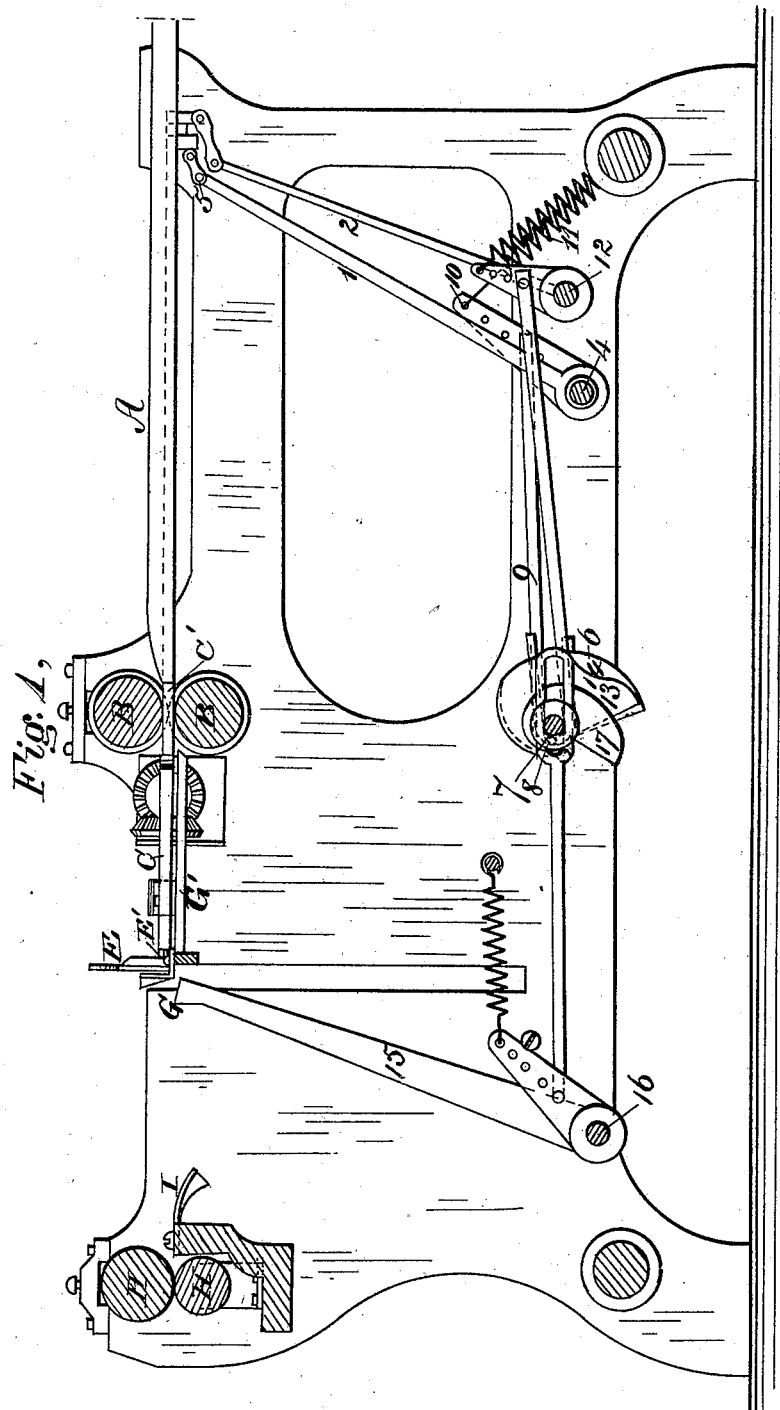


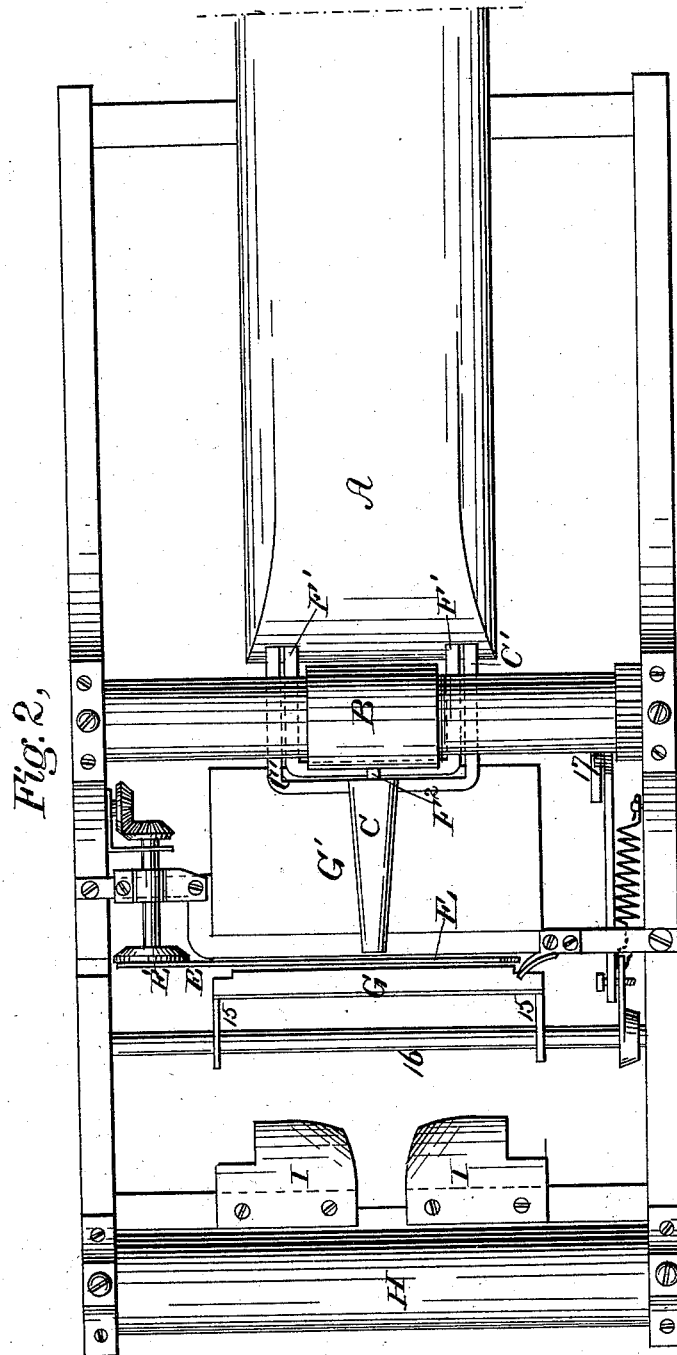
W. C. CROSS.
Paper-Bag Machine.
No. 220,810. Patented Oct. 21, 1879.



Witnesses:
M. Georgio
W. E. Chaffer

Inventor:
William C. Cross,
by M. Bailey
his Atty.

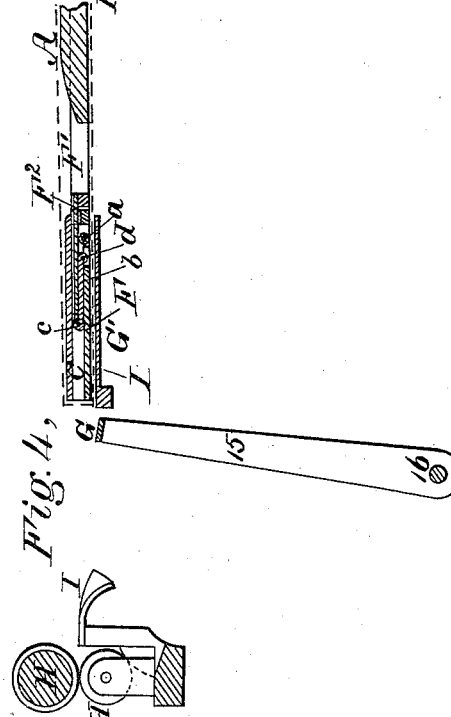
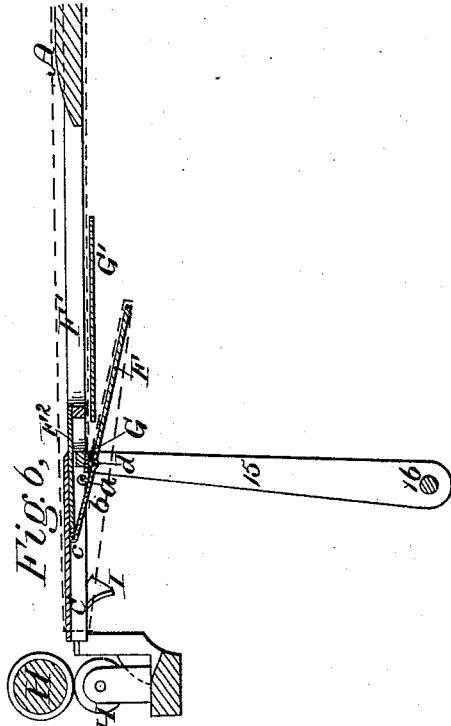
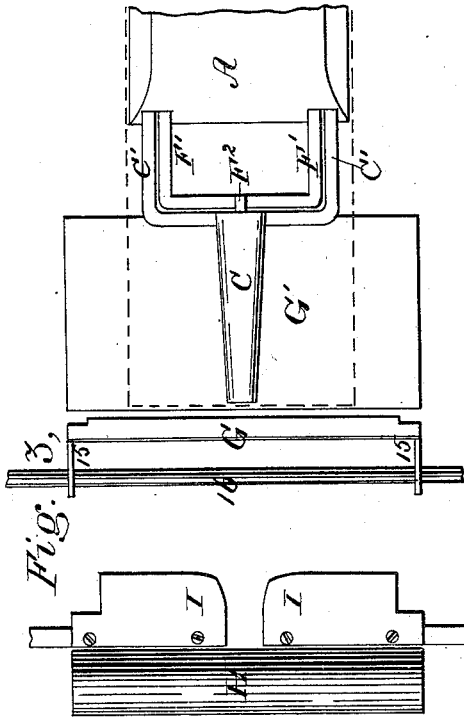
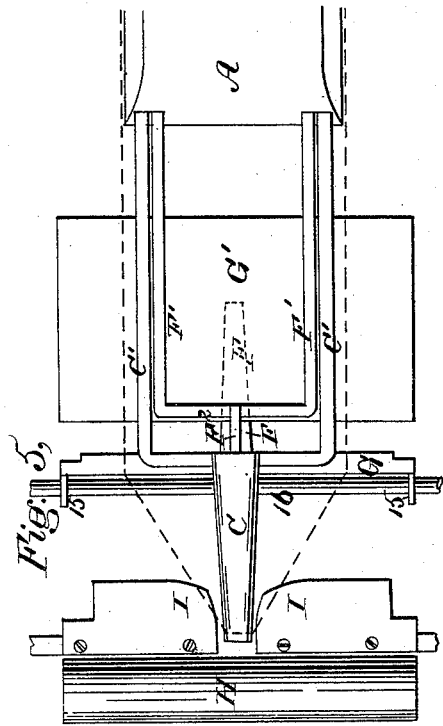
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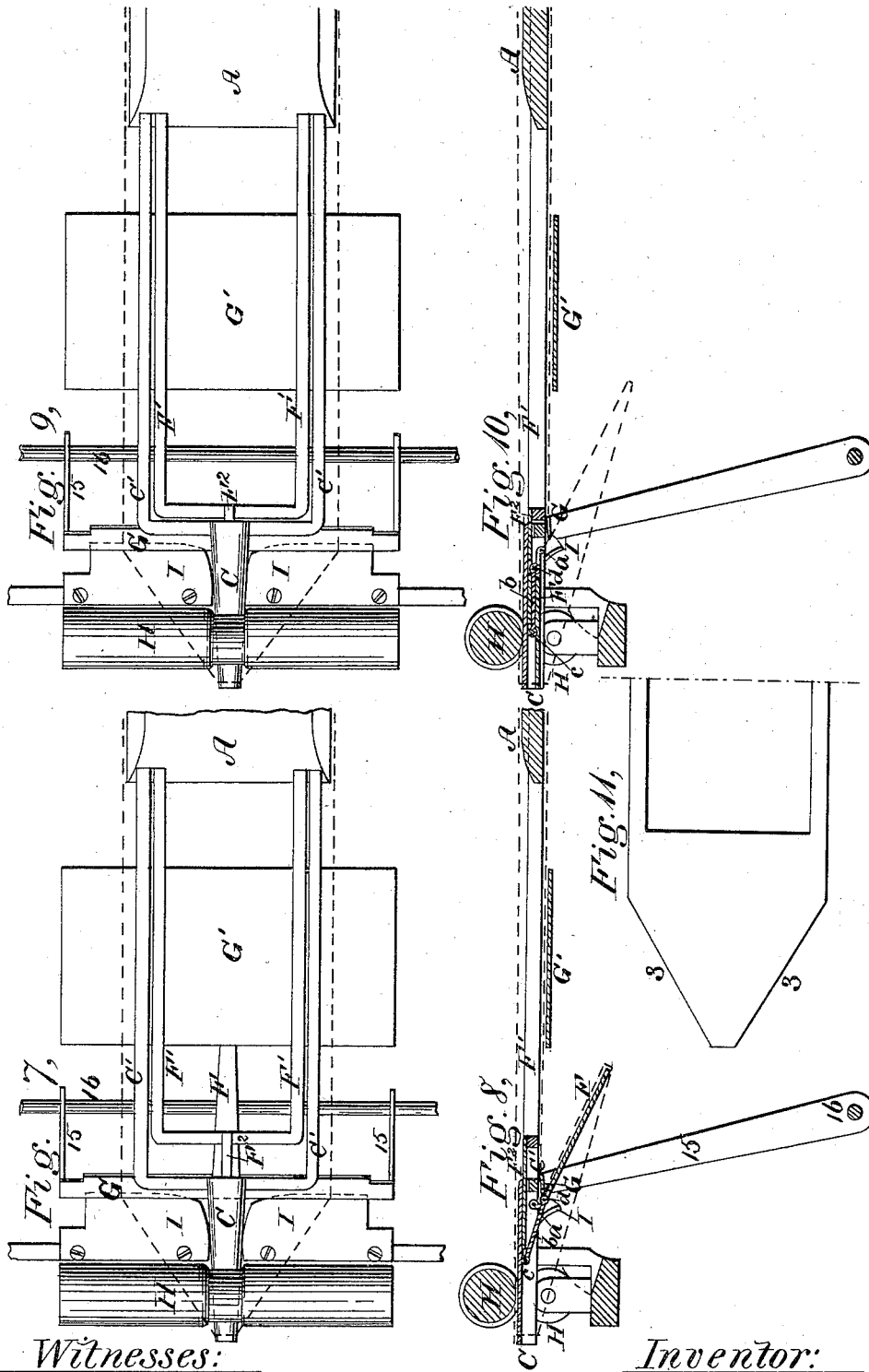
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his Atty.

UNITED STATES PATENT OFFICE.

WILLIAM C. CROSS, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN PAPER-BAG MACHINES.

Specification forming part of Letters Patent No. **220,810**, dated October 21, 1879; application filed August 30, 1879.

To all whom it may concern:

Be it known that I, WILLIAM C. CROSS, of Boston, Massachusetts, have invented certain new and useful Improvements in Machinery for Making Paper Bags, of which the following is a specification.

My invention relates to machinery for making satchel-bottom paper bags, and has particular reference to that portion of said machinery which is designed to make the first or diamond fold.

The object I have in view is to provide a simple and efficient mechanism which will make the diamond fold while the paper tube from which the bag is to be made is in motion, so that this folding operation may take place without interfering with the continuous feed of the tube. To this end I employ, in conjunction with the trunk or other tube-forming device, a reciprocating follower, which is arranged to move within the formed paper tube, and a vibratory folder, which is carried by the follower and works within the tube, and is actuated at proper times and while the follower is in motion to turn back and fold upon the body of the tube one ply thereof in order to make the diamond fold. I also combine with these members an intermittently-moving reciprocatory table or plate, which furnishes an edge to determine the line over which is turned the folded back ply of the tube, and which, so soon as the ply has thus been turned back, moves synchronously with the follower until the first point or end of the diamond fold has been delivered to the mechanism which conveys the partly-formed bag to the devices which are to make the second and third folds, after which follower, folder, and fold guide table or plate rapidly return to their original positions.

The nature of my invention and the manner in which the same is or may be carried into effect will be understood by reference to the accompanying drawings, in which—

Figure 1 is a sectional side elevation of a machine embodying my improvements. Fig. 2 is a plan of the same. Figs. 3 and 4, 5 and 6, 7 and 8, and 9 and 10 are diagram figures, representing in plan and longitudinal central section the folding devices in four different positions which they assume during the making of the diamond fold. Fig. 11 is a plan of a follower of modified form.

A is the stationary trunk, around which the paper tube is formed in the usual way, with the lap in this instance on the under side of the trunk. The tube is formed and the lap pasted by ordinary or suitable means, as will be understood without further explanation by those skilled in the art to which my invention relates. The tube is to be formed in front or in advance of the point to which the vibratory arms 1 2 move, which arms control the follower and the folder, hereinafter referred to. In front of the trunk are the feed-rolls B, between which the formed tube passes.

Arranged to move longitudinally back and forth in guideways in the trunk is the device C, which I have termed "the follower," but which acts as a former in conjunction with the vibratory folder D to make the diamond fold. The follower, in this instance, is composed of a frame, C', whose side bars extend each side of the acting surface of the upper feed-roll, B, and which, at its front end, is provided with the central nose or finger, C, which, in its rearmost position, projects some distance in advance of the trunk, as shown in Fig. 2. This portion C of the follower may have any suitable configuration—as, for instance, it may have the spear shape shown in Fig. 11, the inclined converging edges 3 3 having the slope or inclination required for the corresponding two sides of the diamond fold, thus serving to more accurately determine and assure these lines of the fold. In its rearmost position the front end of the follower is slightly back of the point where the transverse cutter E severs the successive bag-lengths from the tube.

Longitudinal reciprocatory movement may be imparted to the follower by various means.

The means which I have shown in illustration of my invention consist of a vibratory arm, 1, fast on a rock-shaft, 4, and connected by a link, 5, at its upper end to the rear end of the follower-frame. The rock-shaft is operated in one direction by means of a cam, 6, fixed on the power-driven rotary shaft 7, and acting on a roller-stud, 8, which rests on the periphery of the cam, and is attached to a strap-rod, 9, which is jointed to a radial arm, 10, on the rock-shaft. In the other direction the rock-shaft is operated by a spring, 11, which holds the stud 8 at all times against the periphery of cam 6. The cam is shaped to

give a gradual and even forward movement to the follower, and then a quick and almost instantaneous return, the latter movement being due to the recoil of the spring. In lieu, however, of a spring the cam may be grooved with the stud working in the groove, thus giving a positive movement at all times, and dispensing with any spring action.

Pivoted or jointed by a horizontal hinge, *a*, to the under side of the follower, and in a recess therein, is the vibratory folder *F*. This folder, like the follower, may obviously be actuated in various ways.

The means here shown for the purpose are as follows: Within the follower-frame is an independent sliding frame, *F'*, prolonged at its front end into a central bar or rod, *F²*, which is received and adapted to slide back and forth in the front end of the follower between the follower and the folder *F*. The bar *F²* extends beyond or in advance of the hinge *a*, and is connected to the folder by a link, *b*, jointed at one end to the bar *F²* and at the other end to the folder, these joints being indicated at *c* and *d*. The rear end of the folder-frame *F'* is connected by a link to the vibratory rod 2, fast on rock-shaft 12, which rock-shaft is operated from a cam, 13, on the rotary power-driven shaft 7 through the medium of instrumentalities which, being similar to those already described as operating the follower-frame, do not require detailed description.

The folder-actuating cam 13 is substantially of the same shape as the follower actuating cam 6, save that it has a depressed portion, 14, which is concentric with the driving-shaft 7, and is designed to maintain the folder-frame at rest for a short period, during which the follower-frame moves ahead.

Under the arrangement of parts described, it will be seen that when the follower moves and the folder-frame remains at rest the hinge *a* of the folder moves forward with the follower, and consequently the folder, meeting the resistance of the now stationary bar *F²*, will be turned down and back, and so caused to fold back that ply of the paper tube against which it may be brought. Consequently, by properly timing the movements of the follower and the folder-frame, the folder may be caused to move whenever and as far as desired. Its range of movement should be such that it will fold the ply of the tube flat back against the body of the tube or against the intervening guide plate or table, hereinafter referred to, should that be used. As soon as the follower has moved forward independently of the folder-frame far enough to bring the folder to the position just mentioned the two move together in unison until the forward movement is completed. At that moment the folder (owing to the shape of its cam) folds up again into the follower, and the two return together to their original position.

In conjunction with the follower and the vibratory folder *I* use a reciprocatory table or

plate, *G*, which serves to furnish a guide-edge, over which the ply turned back by the folder is bent. This plate is not absolutely necessary, especially if the spear-shaped follower be used, but I deem its use highly advantageous in that it acts to accurately determine the line of fold.

The guide-plate may be arranged to reciprocate horizontally or to rock on an axis. The latter arrangement is represented in the drawings. It is mounted on arms 15, fast to a rock-shaft, 16, which derives its movement through proper intermediaries from a cam, 17, on the rotary shaft 7. The movement of the table or plate is so timed with respect to the movements of the follower and folder that it remains at rest until the latter devices have moved forward far enough to bring the hinge *a* in advance of the front edge of the plate, at which time the folder *F* swings out, down, and back, so as to fold back the under ply of the tube over the edge of the plate as a guide. Then the three devices—follower, folder, and guide plate or table—move forward together in this position until the limit of forward movement has been reached, when all three are retracted rapidly to their original positions, leaving the front end of the diamond fold in the bight of rotating rollers *H*, or other devices which may be used. In order to preserve the diamond fold in shape after it has thus been quitted by the fold-forming devices and while it is being drawn through the rolls *H*, I make use of deflecting-plates *I*, which are curved or bent, as shown, so as to smooth out and keep flat the diamond fold, and so cause it to pass without wrinkling to the rolls.

Inasmuch as the follower and folder, in order to advance far enough to introduce the front end of the blank between the rolls, must enter between the rolls, I cut away the rolls and their supporting-frame at this point, as shown, so that the follower may advance to the proper point and the folder may swing up into place without obstruction while the follower is at said point.

In order to sever the blank from the tube any suitable cutting device may be employed. In this instance I employ a swinging transverse cutter-blade, *E*, which moves on a center, *E'*, in a circular path, cutting the tube between the guide-plate *G* and the stationary table *G'*, the latter furnishing the stationary edge against which the blade *E* acts. The movement of the cutter is so timed that it severs the blank after the follower, folder, and table have returned, and before the follower again moves forward far enough to pass the edge of the stationary table *G'*.

It is not deemed necessary to enter into the details of the mechanism for actuating the cutter, a cutter-blade arranged and operated to swing in a circular path for the purpose of severing bag-lengths being an old device, which I do not claim as of my invention.

The operation of a machine organized as de-

scribed will be understood readily by reference to the diagram figures, in which the dotted or broken lines indicate the blank.

In Figs. 3 and 4 the parts are represented in the position they occupy when about to commence a forward movement.

Suppose the parts to be in this position, with the paper tube passing around the trunk and between the feed-rolls, with its front end about reaching to the front end of the follower. The moment the machine is started the follower (whose forward movement is timed to be synchronous with the feed) and folder, which it carries, move forward along with the tube until the hinge *a* of the folder comes opposite the front edge of the guide-plate *G*. At this time the follower continues its movement, and the guide-plate *G* starts forward also with the follower, while the folder-frame remains at rest, consequently causing the folder to swing quickly down and back to the position shown in Figs. 5 and 6, folding the lower ply over the edge of the plate *G* and back flat against it, thus making the diamond fold. When the parts once assume this position they move forward unchanged until they have advanced far enough to insert the front point of the diamond fold between the rolls *H*, as indicated in Figs. 7 and 8. As soon as this has taken place the folder, by a slight independent forward movement of the folder-frame, is swung up into place in the follower, as indicated in Figs. 9 and 10, leaving the blank in the revolving rolls *H* with the deflecting-plate supporting the diamond fold. Then instantly the parts return again to their original positions, (indicated in Figs. 3 and 4,) while the cutter *E* descends and severs the blank from the tube.

All of the above-described movements are performed with a precision and rapidity which do not interfere with the continuous forward feed of the paper tube.

As stated in the first part of this specification, my invention relates entirely to mechanism for making the first or diamond fold of a satchel-bottom paper bag. It may be employed in conjunction with any suitable mechanism for pasting and folding the second and final folds of the satchel-bottom.

The blank may be delivered by the rolls *H* to any subsequent folding mechanism which may be employed; or it may be delivered direct to the said mechanisms without the intervention of said rolls. I have here shown the delivery-rolls to indicate simply how the blank is to be delivered from the diamond-fold-forming devices; and in using the term "delivery-rolls" I intend any rolls, whether forming part of subsequent folding mechanisms or not, which take from the follower the partly-formed blank.

Having described my invention, what I claim, and desire to secure by Letters Patent, is as follows:

1. In machinery for making satchel-bottom paper bags, the combination, substantially as hereinbefore set forth, with a paper-tube-feeding mechanism, of a reciprocatory follower and a vibratory folder carried by the follower, these two members being arranged within the paper tube from which the bag is to be made, and being operated in the manner substantially as described to form the first or diamond fold while the tube and follower move together.

2. The combination of feeding devices for continuously feeding forward the paper tube, the reciprocatory follower having a forward movement synchronous with said feed, and the vibratory folder carried by said follower and operating to fold back the ply of the tube while the tube and follower are moving together, the combination being and acting substantially as hereinbefore set forth.

3. The combination of the reciprocatory follower, the vibratory folder carried by said follower, and the reciprocatory guide plate or table, these members being combined and operated to move relatively to one another, substantially in the manner and for the purposes hereinbefore set forth.

4. In combination with the reciprocatory follower and the vibratory folder carried by the same, operating together to form the first or diamond fold, as described, the delivery-rolls and the deflecting or guide plates to support and guide the diamond fold to the delivery-rolls after the folding devices move back from said rolls, these members being arranged for joint operation, substantially as hereinbefore shown and set forth.

5. In a paper-bag machine, the combination of a reciprocatory follower, a vibratory folder carried by the same, mechanism for continuously feeding the paper tube, a cutter for severing bag-lengths from said tube, and delivery-rolls, these members being operated to move relatively to one another, substantially as hereinbefore shown and set forth.

6. In a paper-bag machine, the combination of a reciprocatory follower, a vibratory folder carried by the same, a reciprocatory guide plate or table, mechanism for continuously feeding the paper tube, a cutter for severing bag-lengths from said tube, and delivery-rolls, these members being operated to move relatively to one another, substantially as hereinbefore shown and set forth.

7. The method herein described of making the first or diamond fold of a satchel-bottom bag, consisting of opening, raising, and laying and folding back from a point, and by means inside of the tubular blank, one of its plies while said tube is continuously moving.

In testimony whereof I have hereunto set my hand.

W. C. CROSS.

Witnesses:

E. A. DICK,
M. GEORGE.