

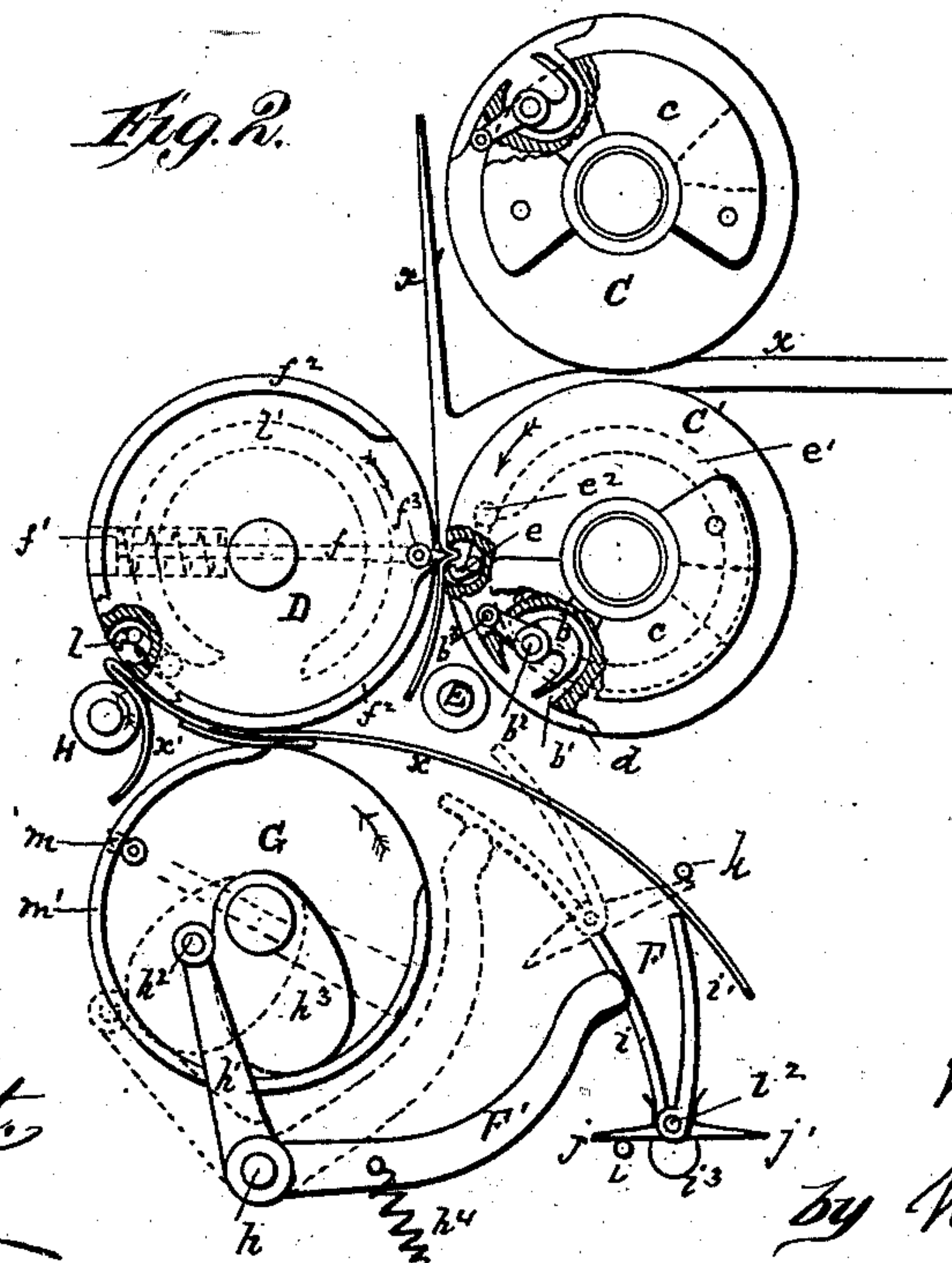
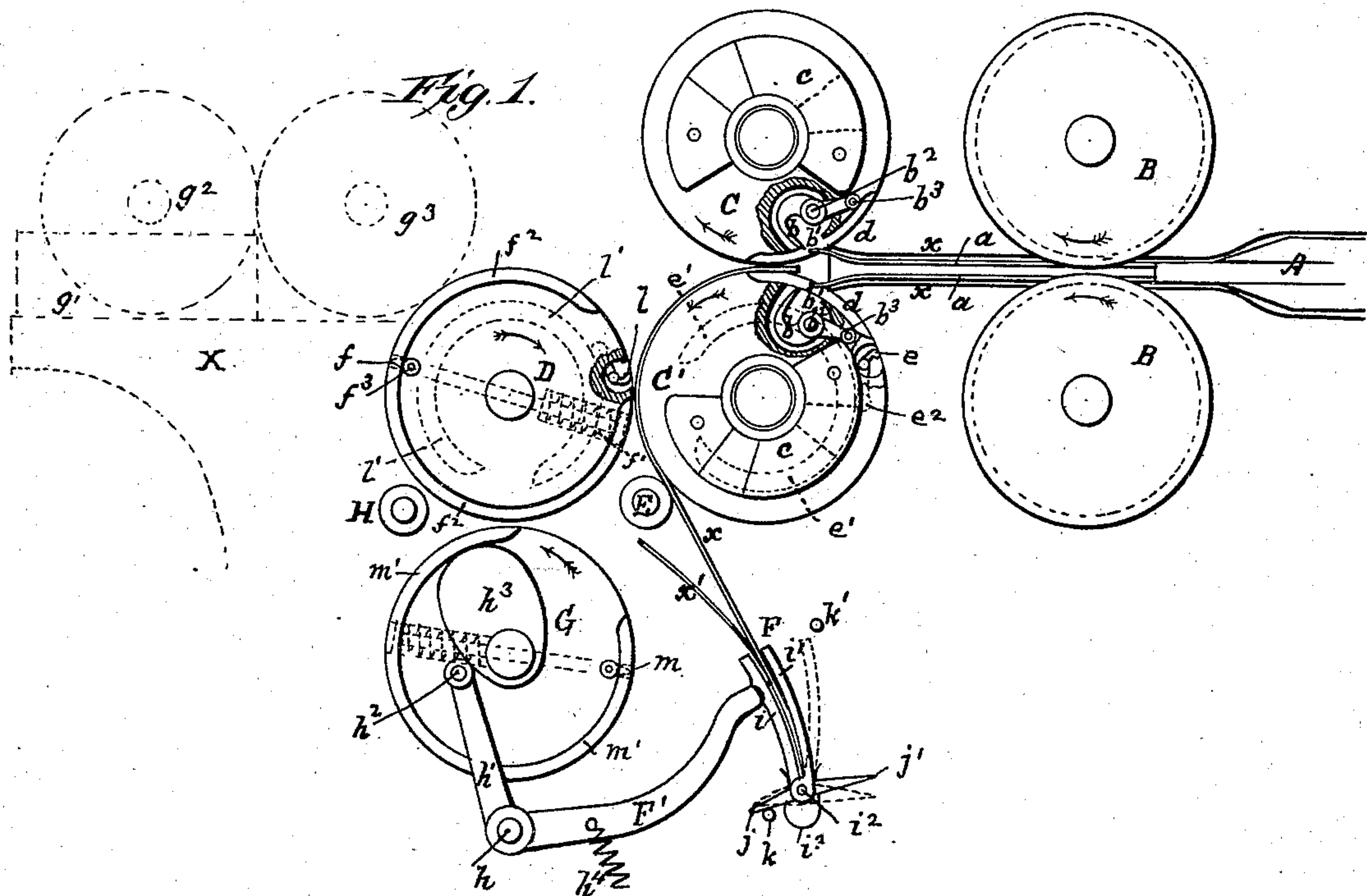
(No Model.)

3 Sheets—Sheet 1.

W. C. CROSS.  
Paper Bag Machine

No. 239,457.

Patented March 29, 1881.



Witnesses.  
Robert Everett.  
Ed. Dick

Inventor.  
Wm C. Cross  
by W. D. Dally  
his Atty.

(No Model.)

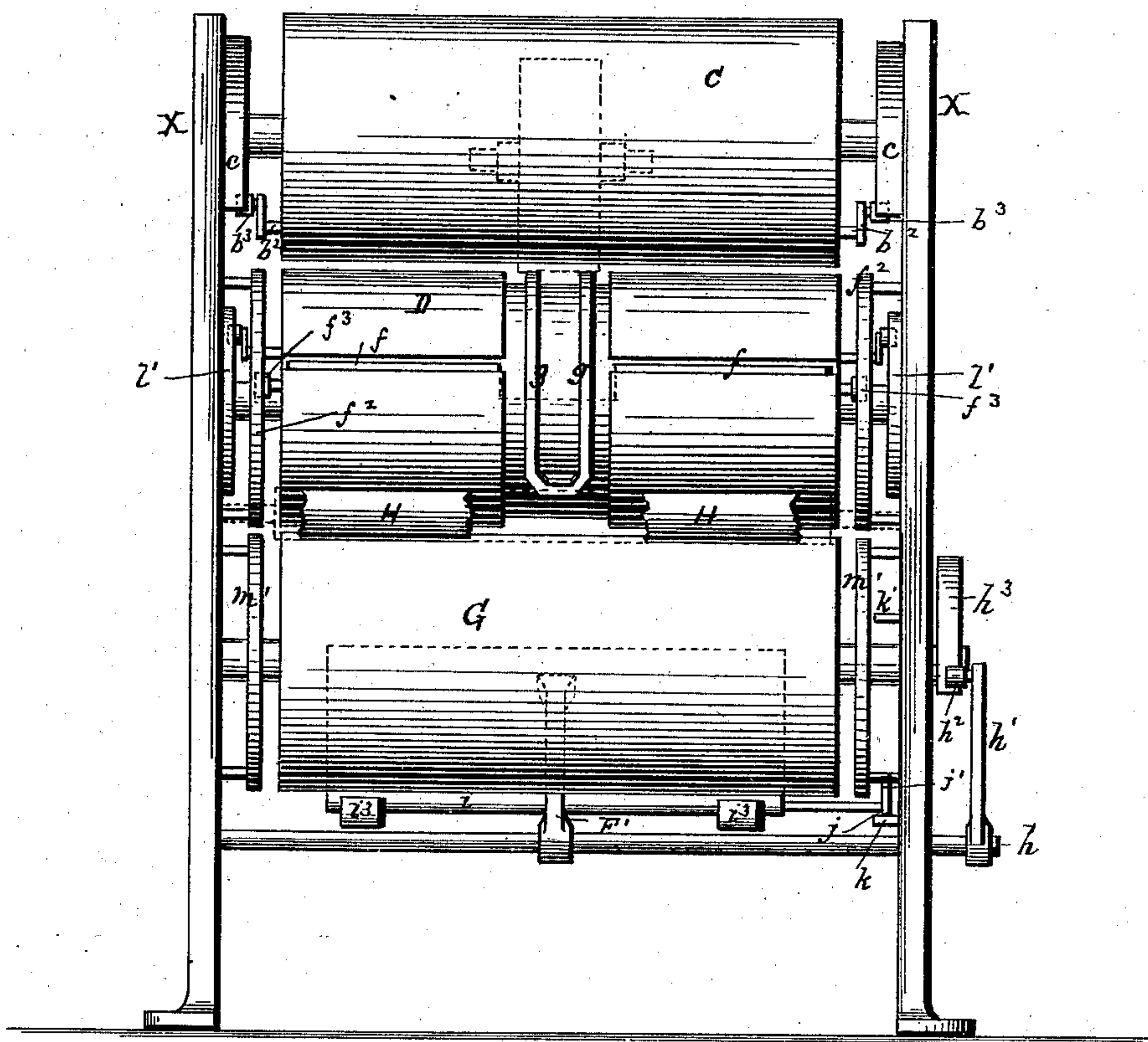
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*Fig. 3.*



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(No Model.)

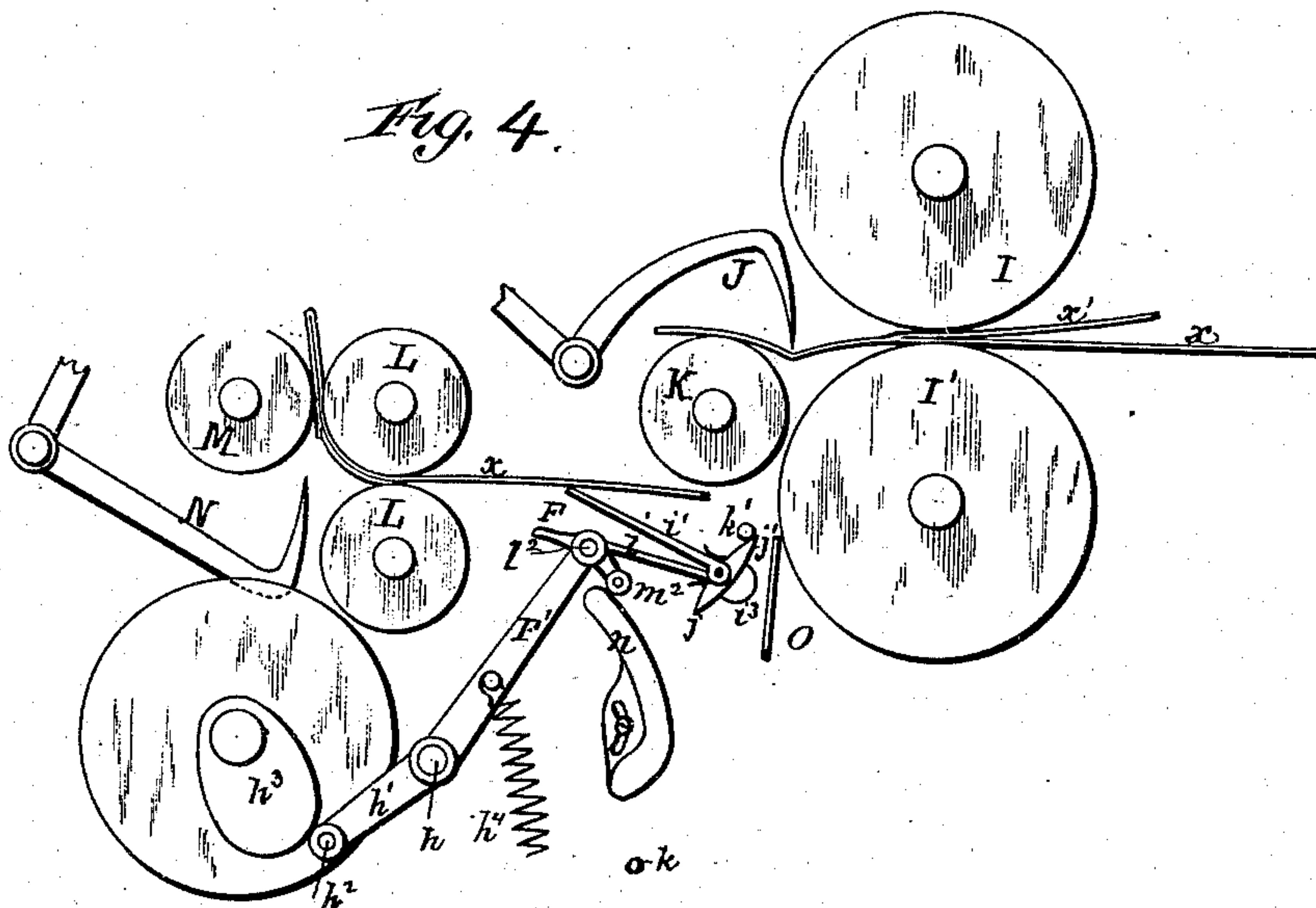
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W. C. CROSS.  
Paper Bag Machine

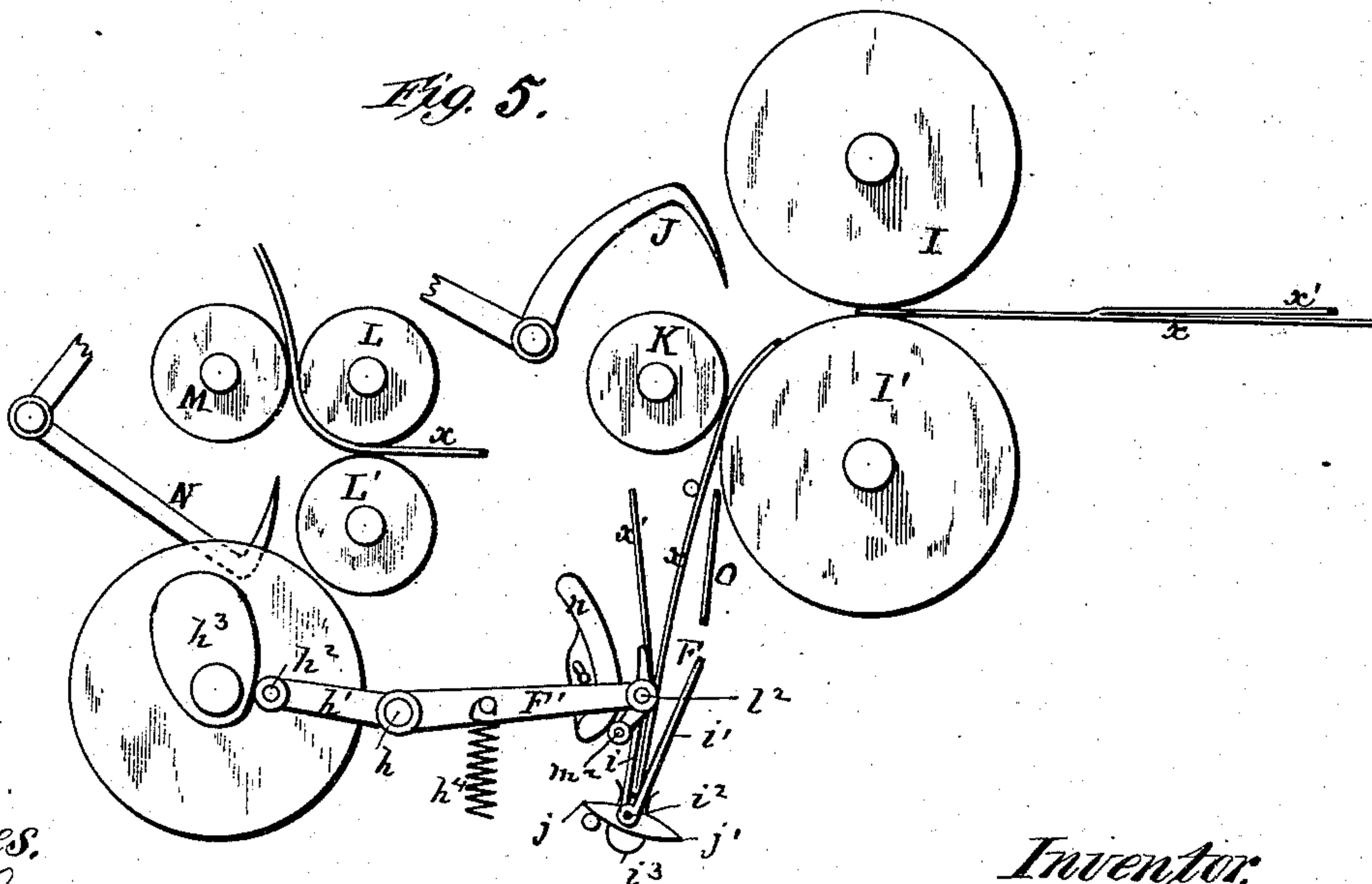
**No. 239,457.**

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*Fig. 4.*



*Fig. 5.*



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# UNITED STATES PATENT OFFICE.

WILLIAM C. CROSS, OF BOSTON, MASSACHUSETTS.

## PAPER-BAG MACHINE.

SPECIFICATION forming part of Letters Patent No. 239,457, dated March 29, 1881.

Application filed February 15, 1881. (No model.)

*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 Satchel-Bottom Paper Bags, of which the following is a specification.

My invention has relation not only to the mechanism for making the primary or diamond fold, but also to means for bringing to the front relatively to the direction of feed that point or flap of the diamond fold which ordinarily overlies the body of the bag-blank.

With respect to the diamond-fold-forming mechanism I have in view an improvement on that kind of machine in which the diamond fold is formed by spreading open the mouth of the blank upon two moving diverging surfaces, to which surfaces the contiguous sides of the blank are caused temporarily to conform. It is my object in this branch of my invention to provide means whereby the plies of the blank, at the mouth end, may be seized by grasping or holding instrumentalities attached to and carried by the rolls before the blank fairly enters the bite of the rolls; and also to provide means whereby the blank may be held open at the mouth end in such manner that its plies will be in position to be readily taken by the grasping or holding instrumentalities.

With respect to the other branch of my invention I have in view a vibratory or oscillatory point-reversing carrier, which receives the blank from the mechanism by which the diamond fold has been made and the front flap of the diamond folded and in the act of presenting it to the succeeding folding mechanism reverses the diamond so as to bring to the front the unfolded flap which formerly overlaid the body of the blank.

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 side elevation of so much of a machine embodying my improvements as is needed for the purposes of explanation. Fig. 2 is a like view of the same with the parts in a different position. Fig. 3 is a front elevation of the machine. Figs. 4 and 5 are side elevations of a modified form of apparatus, hereinafter referred to.

In order to avoid obscuring the instrumentalities in which my invention is more particularly comprised, I have omitted in Figs. 1, 2, 4, and 5 a representation of the supporting-frame and the driving mechanism and gearing. The latter may be of any suitable arrangement and construction, as will be understood without further explanation.

In the drawings, Figs. 1 to 3, inclusive, A is the trunk or former, from which the formed and pasted paper tube passes to the cutting and folding mechanism.

I have not deemed it necessary to show the mechanisms for forming and pasting the paper tube, inasmuch as they are well known to those skilled in the art to which this invention appertains.

B B are feed-rolls, which carry along the tube, and also sever therefrom blanks of required length.

The cutting mechanism is of ordinary construction, and is not shown.

In front of rolls B are nipper-cylinders C C', which act to form the diamond fold.

Extending from the former A are two spring-strips, *a*, which pass between the rolls B, the latter being cut away, as shown by dotted lines, to permit of this, and terminate just in rear of the nipper-cylinders C C', as shown in Fig. 1. The strips *a* are narrow, and extend lengthwise and centrally of the flattened tubular blank which passes around them, and their free ends, which are slightly expanded or spread apart, as shown, serve to open the mouth end of the blank and to present the plies to the nippers carried by the cylinders C C'. These nippers are shown at *b*. Each nipper is mounted in a recess, *b'*, in its cylinder, on a rock-shaft, *b<sup>2</sup>*, which projects from one end of the cylinder, and carries on the projecting end a crank-stud, *b<sup>3</sup>*, which runs upon a stationary cam, *c*, fixed to the frame of the machine. The cam holds the nipper open against the stress of a spring, (not shown,) which, when the nipper is released from the control of the cam, projects the nipper from its recess and causes it to close upon that ply of the blank which it is to grasp. The outer end of the nipper is forked, so that it will straddle the end of the strip or finger *a*, and when it closes on the blank it lies in a depression, *d*, formed in the periphery of the cylinder, the



object being to bring the nipper, when in its closed position, flush with or a little below the surface of the cylinder, so that the two cylinders may revolve in contact without hinderance.

5 The parts are so proportioned and timed with relation to one another that at the time the mouth end of the blank  $x$  reaches the position shown in Fig. 1 the nippers will have come to the position shown in the same figure, where

10 they are represented as about being released from the influence of cams  $c$ . A further movement of the nipper-cylinders releases the nippers, and they at once enter the open mouth and close upon the respective plies of the blank,

15 each nipper holding that part of the blank grasped by it against the bottom of the depression or recess  $d$ . It will thus be seen that I am enabled to grasp the blank by the nippers before it has entered the bite of the cylinders.

20 Continued revolution of the cylinders draws the blank thus held along between them, and the mouth end of the blank is gradually spread apart by the two diverging moving surfaces on which its plies are held. The cams

25  $c$  are made adjustable, and are so set that the nipper on the upper cylinder will release its hold before the nipper on the lower cylinder does. The latter retains its hold until the point which it holds of the diamond fold thus

30 partially formed by the action of the nipper-cylinders is entered between the lower cylinder,  $C'$ , and the pressure-cylinder  $D$ , which runs in contact therewith, and the diamond is completed in the usual way by its passage

35 between these two cylinders. The blank, with the diamond fold thus made, can be subsequently acted on by any suitable mechanism for completing the satchel-bottom.

In the machine shown in the drawings the

40 lower cylinder,  $C'$ , is made use of, in connection with the cylinder  $D$ , to make the second fold—that is to say, to fold the front flap of the diamond. To this end I provide the cylinder  $C'$  with a nipper,  $e$ , which operates in

45 conjunction with a knife or blade,  $f$ , in cylinder  $D$ , the blade  $f$  acting to tuck the blank into the bite of the nipper  $e$ . The blade is projected from the cylinder by a spring,  $f'$ , and is drawn back into the cylinder against the stress of

50 the spring by a stationary cam,  $f^2$ , fixed to the frame, and acting on a laterally-projecting stud,  $f^3$ , on the blade. The nipper  $e$  is caused to close against the front side of the recess in which it is situated by a spring, (not shown,) and is opened against the stress of the spring

55 by a stationary cam,  $e'$ , fixed to the frame of the machine, and shown in dotted lines in Figs. 1 and 2 and in full lines in Fig. 3, said cam acting on the crank-arm  $e^2$  of the nipper

60 in the usual way. These instrumentalities are well known, being shown, for instance, in Stocking's patent, No. 222,544, of December 4, 1879, and do not require detailed description. They are so positioned and timed in their

65 movements that by the time the front flap of the diamond has passed between the cylinders  $C'$  and  $D$  to the extent indicated in Fig. 2 the

nipper and blade will meet, the blade tucking the flap along the line of fold into the bite of the nipper, and then withdrawing, and the nipper at once closing on the part thus tucked into the bite. The blank is then carried along between the cylinder  $C'$  and the pressure-roll  $E$ , which wipes back the front flap and presses down the fold upon the body of the blank, the blank passing from between these rolls, as indicated in Fig. 1, to the mechanism which is to act next upon it. The lines of paste, which must be deposited on the diamond fold preliminarily to making the succeeding fold, are delivered from the cylinder  $D$ , which, as shown in Fig. 3, is provided with central paste ribs or ridges,  $g$ , of the usual pattern, so placed as to deliver the paste along the proper lines on the diamond fold. The paste is supplied to the ridges  $g$  from the paste-trough  $g'$  on the frame  $X$  of the machine through the intermediary of rolls  $g^2$  and  $g^3$  in the usual way.

Having made the diamond and second fold, it remains to complete the satchel-bottom by folding the rear flap of the diamond, or that flap which overlies the body of the bag-blank. In order to bring this flap to the front relatively to the direction of the feed, so that it may be more readily acted on by the folding instrumentality, I make use of what I have termed a "vibratory" or "oscillatory" point-reversing carrier. This device consists of a pocket,  $F$ , attached to an arm,  $F'$ , fixed on a rock-shaft,  $h$ , mounted in proper bearings on the machine-frame, and having at one end an arm,  $h'$ , which carries a stud,  $h^2$ , that is held against the periphery of a rotating cam,  $h^3$ , by a spring,  $h^4$ . A rotation of this cam will impart an oscillatory or vibratory movement to the pocket  $F$ . Into this pocket the blank which passes from between the cylinders  $C'$  and  $E$  enters, as shown in Fig. 1, the pocket being of such depth that its upper end, when the blank has fully entered it, will be above the central transverse line of fold of the diamond. The pocket is composed of two parts, a plate,  $i$ , fastened to the arm  $F'$ , and a jaw-like plate,  $i'$ , which is hinged at  $i^2$  to the fixed plate  $i$ , and is pressed closely against the plate by a spring,  $i^3$ . From the hinged plate project two studs,  $j$   $j'$ , and projecting from the frame of the machine are two fixed pins or abutments,  $k$   $k'$ , which are so placed that when the pocket is in its lowest position the stud  $j$  will bear upon pin  $k$ , which will cause the pocket to open, as shown in Fig. 2, and when the pocket is in its highest position the stud  $j'$  and pin  $k'$  will meet, and thus open the pocket, as indicated by dotted lines in the same figure. The parts are so positioned and timed as to their movements that the pocket remains in its lowest and open position until the blank has entered it to the proper extent. It then begins to rise, simultaneously closing upon the blank, as indicated in full lines in Fig. 1. Inasmuch as the upper end of the pocket extends above the central line of fold of the diamond, the effect is to throw the unfolded flap  $x'$  some-



what in front, as shown in the figure referred to. The pocket, rapidly moving upon the axis of the shaft *h* as a center, throws up and forward the unfolded flap into the bite of suitable conveying-rolls, (which in this instance are cylinders D and G,) opening as it reaches the extreme of its movement in this direction, so as to release the blank. The body of the blank is retained between the parts C' and E long enough after the pocket commences its movement to prevent it (the blank-body) from interfering with the tucking of the flap between the rolls. As soon as the point-reversing carrier has thus delivered the blank it returns to the first position in time to receive the next succeeding blank. The flap *x'*, thus delivered to the cylinders D and G, is folded by means of a nipper, *l*, in cylinder D and a tucking-blade, *m*, in cylinder G, in connection with the pressure-roll H, in the same way as the first flap was folded by the cylinders C' and D and pressure-roll E, the nipper *l* and blade *m* being controlled by springs and by cams *l'* and *m'* in the same manner as the nipper *e* and blade *f*, hereinbefore described, and having the same mode of operation. This last fold completes the satchel-bottom, and the bag is discharged from the machine in the usual way.

I remark that while the machine shown in the drawings combines the features of my invention in one compact organization, yet it is manifest that the diamond-fold-forming devices can be used in connection with any suitable mechanism for completing the satchel-bottom, and that the vibratory or oscillatory point-reversing carrier can be employed to convey the blank from the mechanism that has acted on it to the mechanism that must subsequently act on it in order to complete the satchel-bottom, whether those mechanisms be constructed as hereinbefore described or be of other known or suitable construction. I can, for instance, use the carrier with rolls and reciprocatory or vibratory folding-blades, as indicated in Figs. 4 and 5. In this arrangement the diamond-folded blank is fed point foremost between rolls I I' until its front flap projects the proper distance. Blade J then descends and, as indicated in Fig. 4, makes the fold and tucks it between rolls I' K. The partly-folded blank descends into the pocket F, as indicated in Fig. 5, and the pocket then delivers it, flap *x'* in front, to rolls L L', through which the flap *x'* passes the proper distance, and is then folded and tucked by blade N into the bite of rolls L M, as indicated in the same figure, thus completing the bag. The point-reversing carrier shown in these figures is similar to that shown in the preceding figures in operation, and in construction as well, save that in the latter respect its plate *i*, instead of being rigidly fastened to the arm F', is hinged thereto at *l*, and is provided with an arm, *m*<sup>2</sup>, which is held with yielding pressure against the acting edge or face of a cam, *n*, adjustably fastened to the

frame of the machine. This cam serves to tilt the pocket F, as a whole, in such manner that at its two extremes of movement it will be caused to assume the proper position to enable it to receive the blank, as in Fig. 5, and to deliver it to best advantage to rolls L L', as in Fig. 4. The part O in these figures represents a stationary guide-plate, which directs the blank into the pocket below.

I have described what I believe to be, on the whole, the best arrangement of the diamond-fold-forming mechanism; but it is manifest that the same may be varied to some extent, the essential feature being ply-grasping devices, one on each cylinder, operated to close upon the respective plies of the blank before the latter enter the bite of cylinder, in combination with means whereby the mouth end of the blank, at the point where the ply-grasping device takes hold of the plies, is held open sufficiently to enable said devices to enter the mouth of the blank for that purpose.

It will be noted that the spring-opening fingers *a* extend between the cylinders C C' far enough to bring their ends into the peripheral recesses or depressions *d*, so that they will come in contact with the uncut or unrecessed portions of the cylinders as the latter revolve. This, however, is productive of no disadvantage, inasmuch as the fingers are springs sufficiently light to permit them to be pressed together without inconvenience.

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

1. In combination with the rotary diamond-fold-forming cylinders, intermittently opening and closing ply-grasping devices, one on each cylinder, arranged and operated to close upon the respective plies of the blank before the latter enters the bite of the cylinder, and means, substantially such as described, whereby the mouth end of the blank, at the point where the ply-grasping devices take hold of the plies, is opened to enable the said devices to enter the mouth of the blank for that purpose, substantially as hereinbefore shown and set forth.

2. The rotary diamond-fold-forming cylinders and ply-grasping devices carried by the same, and arranged and operated to intermittently open and close so as to grasp and release the blank at the times and in the manner substantially as described, in combination with means, substantially such as described, for opening the mouth of the blank to permit the said ply-grasping devices to enter therein before the blank enters the bite of the cylinders, and a pressure roll or cylinder, as D, the combination being and acting substantially as hereinbefore set forth.

3. The combination, substantially as hereinbefore set forth, of the elastic and yielding opening-fingers, the rotary diamond-fold-forming cylinders, formed with nipper-receiving peripheral depressions, and the vibratory nippers



mounted in said cylinders and arranged and operated to open and close at the times and in the manner described.

4. In machinery for making satchel-bottom paper bags, a vibratory or oscillatory point-reversing carrier, arranged and operating, substantially as herein shown and described, to receive the partially-folded blank from the mechanism in rear and deliver the same, with points of diamond reversed, to the mechanism in front.

5. The combination, with the mechanism from which the partially-folded blank passes to the point-reversing carrier and the mechanism to which the blank is delivered from said carrier with the points of the diamond reversed, of the point-reversing-carrier pocket, constructed, arranged, and operated to move back and forth for the purpose of receiving

and delivering the blank, and to open and close for the purpose of grasping and releasing the blank received by it at the times and in the manner hereinbefore shown and set forth.

6. A mechanism for folding the satchel-bottoms of paper bags, consisting of four cylinders, CC'DG, and the several herein-described instrumentalities carried by them, the rolls E H, and the vibratory or oscillatory point-reversing carrier, these elements being combined and arranged for joint operation substantially as hereinbefore shown and set forth.

In testimony whereof I have hereunto set my hand this 26th day of January, 1881.

WILLIAM C. CROSS.

Witnesses:

E. A. DICK,  
N. C. LANE.