2 Sheets—Sheet 1

W. C. CROSS.

Paper-Bag Machine.

No. 221,530. Patented Nov. 11, 1879.

Fig. 1.

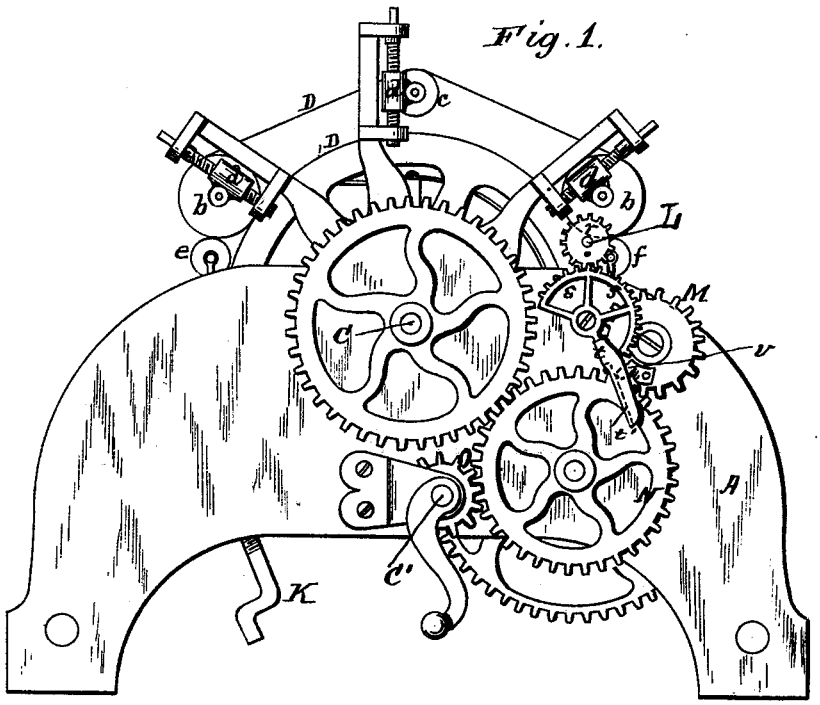

Fig. 2.

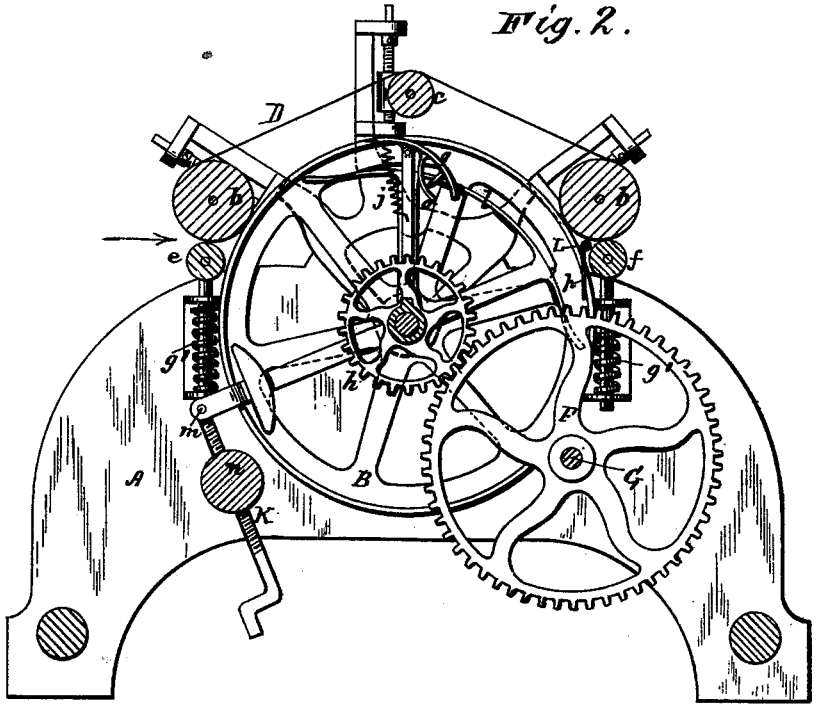

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Fig. 3.

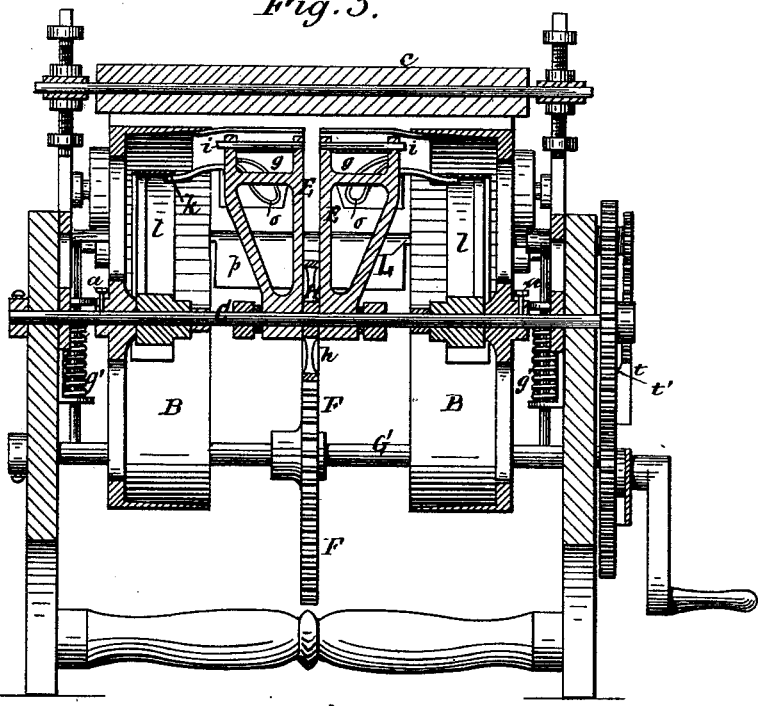


Fig. 4.

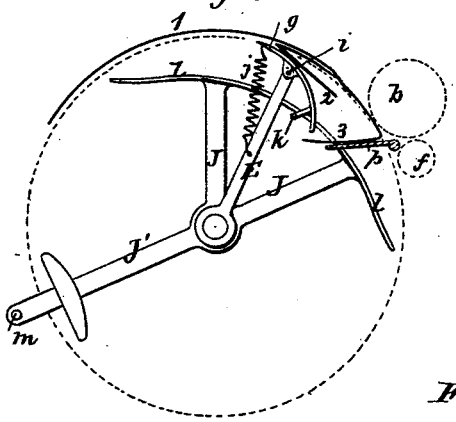


Fig. 5.

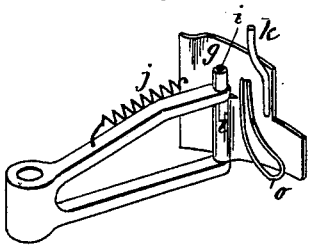


Fig. 6

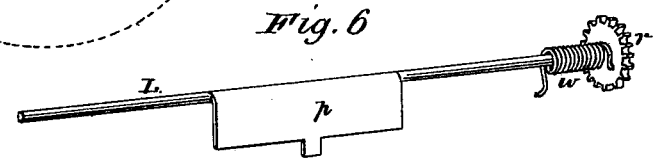
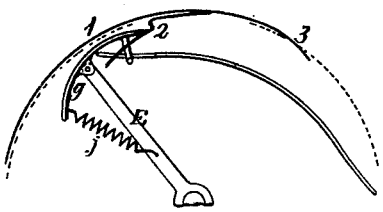


Fig. 7.



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UNITED STATES PATENT OFFICE.

WILLIAM C. CROSS, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN PAPER-BAG MACHINES.

Specification forming part of Letters Patent No. **221,530**, dated November 11, 1879; application filed September 29, 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 Machines for Making Paper Bags, of which the following is a specification.

My invention relates to the manufacture of square or satchel bottom bags, and has particular reference to machinery for making the second and final folds of the satchel bottom.

It is my object to make these folds while the bag-blank is in motion and without interfering with its regular and continuous progression through the machine.

It is also my object to accomplish this result, as far as possible, through the instrumentality of devices which have a rotary motion, or a motion continuous in one direction, in order to increase the capacity of the machine for doing work, as well as to avoid the jars and strains incident to the employment of devices having a reciprocatory or back-and-forth movement.

I make use of a rotary carrier-cylinder, between which and an endless belt extending partly around and in contact with its periphery the blank is carried, and is held thoroughly under control during the folding operation and until the completed bag is discharged from the machine. The carrier-cylinder determines the lines of fold, and for this purpose is open in the center, being, in effect, composed of two drums or short cylinders set the proper distance apart from one another on the same axis, the distance between them determining the size, or rather breadth, at the folding-line of those portions of the flaps of the diamond fold which are to be turned over and folded to make the second and final folds. These two cylinder-sections can be made adjustable to and from one another to vary the fold, thus readily adapting the carrier-cylinder for bags of varying sizes.

In connection with the carrier-cylinder I employ a rotary folder for making the second fold, which is mounted on the same axis with the cylinder and revolves in the same direction as, but more rapidly than, said cylinder. This folder operates on the blank from the inside of the cylinder through the central opening therein. I also employ a folder for making the third fold, consisting of a vibratory blade fast on a rock-shaft mounted in bearings in the machine-frame, which folder is also arranged to operate from the inside on the blank. Both of these folders are disconnected from and independent of the carrier-cylinder; but both at the same time operate on the blank from the inside of the cylinder through the central opening which intervenes between the drums or short cylinders composing said carrier-cylinder.

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 mechanism embodying my invention. Fig. 2 is a longitudinal vertical central section of the same. Fig. 3 is a transverse vertical section of the same, the plane of section passing through the axis of the carrier-cylinder. Figs. 4 and 7 are diagrams representing the folders in the positions which they assume when the folds are made. Fig. 5 is a view of one section of the second folder detached. Fig. 6 is a view of the third folder detached.

The several parts of the machine are mounted in a frame, A, of proper construction.

The carrier-cylinder hereinbefore referred to is composed of two short drums or cylinders, B, placed a proper distance apart on the same axis or shaft C, to which they are made fast by suitable means. I prefer to make them adjustable to and from one another, for the reason above stated, and to this end I mount them so as to be capable of sliding longitudinally on shaft C, and hold them in place by set-screws *a*. This is one convenient way of securing their adjustment. Other mechanical devices which will readily suggest themselves can, however, be used for the same purpose. Extending around, say, a little more than a third of the carrier-cylinder is an endless belt or apron, D, Fig. 1, which runs around the two end rollers, *b*, and over the central roller, *c*. These rollers are all mounted in adjustable boxes *d*, by which the tension of the belt can be regulated. The two end rollers are set closely enough to the carrier-cylinder to cause the portion of the belt next to the cylinder to lie closely against the latter.

The upper central roll, *c*, is used to stretch the belt more or less, so as to regulate its tension. Below each roll *b* is a roller, *e* or *f*, upheld by springs *g'*, as shown.

The blank enters between *e* and *b* at one end of the machine, and is discharged or delivered from between *b* and *f* at the other end. All of the aforesaid rollers are caused to revolve by the belt, which is driven by frictional contact with the carrier-cylinder.

The blank, with the diamond fold down or undermost, travels from *e* to *f* between the belt and the cylinder, by which two devices it is firmly held and controlled during the folding operation. The sides of the bag-blank are held on the cylinder; but the central portion of said blank comes opposite the opening between the cylinder-drums B, and the end flaps of the diamond fold are thus exposed and put in position to be operated on from the inside of the cylinder.

I remark that while I prefer to construct the carrier-cylinder as above described, yet it may be made in one piece, an opening or openings of suitable length being formed at the proper point or points in its periphery to permit the folders to operate therethrough upon the blank.

The second folder is composed of a folding-blade, *g*, which, in this instance, is made in two sections, as shown in Fig. 3, to permit it to pass the driving-gear. This construction, however, is incidental to the particular arrangement of gearing which I have represented, and which I prefer to employ. Each section is attached to the outer extremity of a radial arm, E, fastened to a common pinion, *h*, mounted loosely on the axis or shaft C and driven by spur or gear wheel F on shaft G, said shaft being driven by suitable power, and being suitably geared to the carrier-cylinder. Under this arrangement the folder-blade *g* will make between two and three revolutions for every one revolution of the carrier-cylinder.

The folder-blade may be connected to its radial support E in various ways. The arrangement which on the whole I prefer is shown in the drawings. Each section of the folding-blade is hinged or pivoted at *i* to its radial arm E, and its rear end is connected with said arm by a spring, *j*, which tends to draw that end toward the center, thus forcing outwardly against the belt the beak or front end of the folder.

Projecting laterally from the outer edge of each section in front of the pivot *i* is a pin or roller-stud, *k*, which is intended to travel a cam-track, *l*, by which the heel of the folder is forced outwardly against the stress of the spring *j*. There is one cam-track for each section. Each of said tracks is fastened to the outer extremity of a sectoral frame, J, which is hung loosely on the shaft C, and adjusted to various positions by means of an adjusting-screw, K, jointed at *m* to an arm, J', of the sectoral frame, and screwing through a bearing, *n*, attached to the frame A.

The object of the adjustment is to adapt the folder to pick up the flap of bags of varying sizes. The smaller the bag the farther away from the front of the machine is the track moved, and vice versa. A guard-finger, *o*, is placed on the front of each section, in order to prevent the inner face of the diamond fold from bulging toward the center of the machine, and thus becoming liable to crease and make an irregular or imperfect fold.

The end of the flap picked up by the folder lies between the folder and these guard-fingers *o*, and, as the nose of the folder rises, is bent back far enough to take out all slack from the material composing the face of the diamond fold.

At or near the rear or delivery end of the machine is the third folder, *p*, which is a blade or plate fast on a rock-shaft, L, mounted in bearings in the frame A, and extending transversely across the machine in the space included between the carrier-cylinder and the final or delivery rolls *b f*, as seen in Fig. 3. This folder works in the space intervening between the two drums B, and is shown in its open or normal position in Fig. 3. When it operates to make the fold it moves rapidly, and, indeed, almost instantaneously, in the opposite direction—that is to say, upward—so as to fold over the point of the diamond.

It is operated as follows: The shaft L has mounted on one end a pinion, *r*, which engages a spur-wheel or spur-sector, *s*, mounted loosely on a stud on the machine-frame. From the wheel *s* projects an arm, *t*, provided with a laterally-projecting longitudinal flange, *t'*, indicated in dotted lines in Fig. 1, which lies in the path of a wiper-stud, *v*, on the pinion M, which is driven from the driving-shaft C' through spur-wheels N O.

On shaft L is a coiled spring, *w*, attached at one end to pinion *r*, and at the other end to frame A, which tends to move the shaft in a direction opposite to that in which it is moved by the gearing. The wiper-stud *v*, as its pinion revolves, engages the arm *t*, causing a part revolution of the wheels *s r*, and consequently a like movement of the rock-shaft L sufficient to cause the folder *p* to move to the open position shown in Fig. 2. By this time the wiper-stud will have traveled far enough to quit the arm *t*, and the latter being thus released, the coiled spring *w* will, by its reaction, at once move the shaft L in the opposite direction, thus causing the folder *p* to rapidly shut down on and fold over the front end of the diamond fold, which by this time has been brought to the proper position to be thus acted on.

The blank to be operated on of course has had the first diamond fold formed by proper means. Paste is applied to said fold by suitable instrumentalities, either before the blank enters the machine, or at the time it enters the machine. In the latter event the lower roll, *e*, can be properly cut or formed so as to apply paste to the diamond fold along the

proper lines, obtaining its paste for the purpose in any suitable way, as will be understood without further explanation.

Assuming the machine to be put in motion and the blank to be entered between the belt and the carrier-cylinder, with the diamond fold to the inside and properly supplied with paste, the operation of the folding mechanisms will be as follows: The second folder, *g*, is so placed, and its movement is so timed with respect to the feed that, moving, as it does, more rapidly than the cylinder, it will come up to the rear flap or end of the diamond fold after the latter has fully entered the machine. The point or nose of the folder, which at this time runs against the blank, passes between the body 1 of the blank and the rear flap, 2, of the diamond fold, and picks the latter up. As soon as it does this its laterally-projecting pins *k* begin to ride over the cam-tracks *l*, as indicated in diagram, Fig. 7, whereby the nose or front of the folder is turned inward away from the blank, (which draws from it the point of the flap,) while the heel of the folder, on the contrary, is moved outwardly, wiping along the flap and turning and folding it over along a line determined by the points at which said flap is held on each side by the drums B, as indicated in Fig. 4. By the time the fold is fairly made and pressed down the front point or flap, 3, of the diamond has advanced far enough to bring the line on which it is to be folded up to, or nearly up to, the axis of the vibratory third folder, *p*, and the latter, whose movement is properly timed for this purpose, now springs suddenly upward and folds over the third fold, as indicated in Fig. 4, where the third folder, for the sake of greater clearness, is represented about midway in its upper course. Said folder, however, folds closely against the cylinder, so as to permit the second folder to pass it without difficulty, and the completed bag passes out between the final or delivery rolls *d f*.

For small bags the second folder should be made to revolve more rapidly than for large bags, and the movement, also, of the third folder will require to be correspondingly varied. This, however, can readily be accomplished by changing the gearing, as will be understood without further explanation.

By carrying through the blank with its diamond fold face downward or next to the cylinder, I bring said blank in a position where it can be readily and conveniently operated on by folding devices within the cylinder, which work through the cylinder from its inside upon the portions of the flaps exposed, the cylinder-edges which bound the opening through which the folder or folders work determining the line of fold by holding firmly all portions of the diamond fold save the exposed portions of the flaps. I can fold these flaps by means of folders, which are carried by and move with the cylinder, as well as by independent folders, but have shown the latter arrangement, inasmuch as I prefer it on some accounts.

I do not restrict myself to the details herein shown and described in illustration of my invention, for it is manifest that the same may be varied, not only in the particulars above noted, but in others also.

What I claim, and desire to secure by Letters Patent, is as follows:

1. The carrier-cylinder provided with a central peripheral opening or openings formed to expose the portions of the blank to be operated on from within the cylinder, as described, in combination with the endless belt, between which and said cylinder the blank is held and carried, substantially as and for the purposes hereinbefore set forth.

2. The rotary carrier-cylinder, composed of two short drums or cylinders mounted on the same axis and adjustable to and from one another to vary the distance between them, substantially as and for the purposes hereinbefore set forth.

3. The combination, with the carrier-cylinder provided with a peripheral opening or openings formed to expose the portions of the blank to be operated on from within the cylinder, as described, and means for holding the blank on said cylinder, of folding devices arranged and operated to act from the inside of and through said cylinder upon the blank carried thereon, substantially as hereinbefore set forth.

4. The combination, with a carrier-cylinder provided with a peripheral opening or openings, as described, and means for holding the blank on said cylinder, of folding devices independent of and disconnected from the said cylinder, arranged and operated to act from the inside of and through the cylinder upon the bag-blank carried on the exterior of said cylinder, substantially as hereinbefore set forth.

5. In combination with the rotary carrier-cylinder provided with a peripheral opening or openings, as described, and means for holding the blank on said cylinder, the second folder revolving on the same axis and in the same direction as, but at a greater speed than, said cylinder, and arranged and operating to pick up and fold over the rear flap of the diamond fold of the blank carried upon and moving with said cylinder, substantially as hereinbefore set forth.

6. The vibratory third folder and means for actuating the same to move, substantially as described, in combination with the rotary carrier-cylinder provided with a peripheral opening, through which the said folder acts from the inside of the cylinder on the blank, and means for holding the blank on said cylinder, substantially as hereinbefore set forth.

7. The combination, substantially as hereinbefore set forth, of the rotary carrier-cylinder, composed of two short cylinders or drums, as described, the endless belt, the rotary second folder, the vibratory third folder, and means for actuating said folders and cylinder to move relatively to one another, substantially as specified.

8. In a machine for making satchel-bottom bags, the combination, with a carrier by which the blank is held and fed along, of a rotary oscillating folder, which moves at a greater speed than the carrier, and operates to pick up and turn and fold over one of the flaps of the diamond fold of the said blank, substantially as hereinbefore set forth.

In testimony whereof I have hereunto set my hand this 27th day of September, A. D. 1879.

W. C. CROSS.

Witnesses:
E. A. DICK,
M. GEORGII.