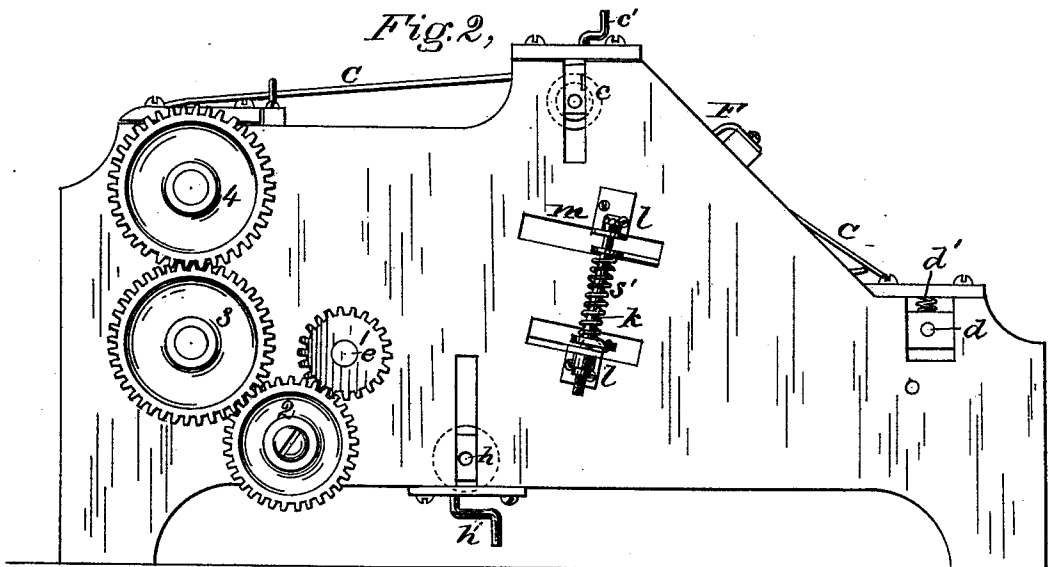
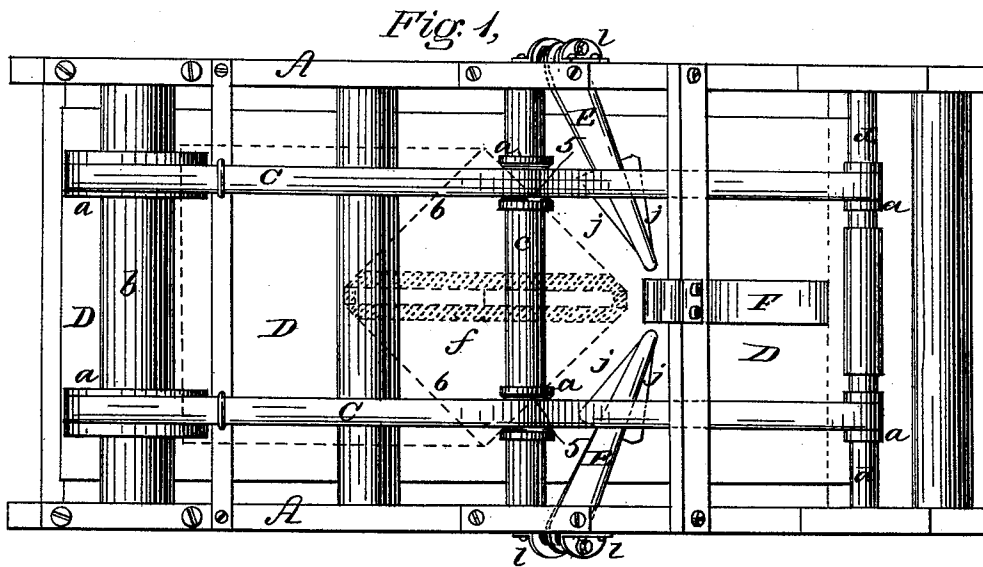


W. C. CROSS.
Paper-Bag Machine.
No. 222,465. Patented Dec. 9, 1879.



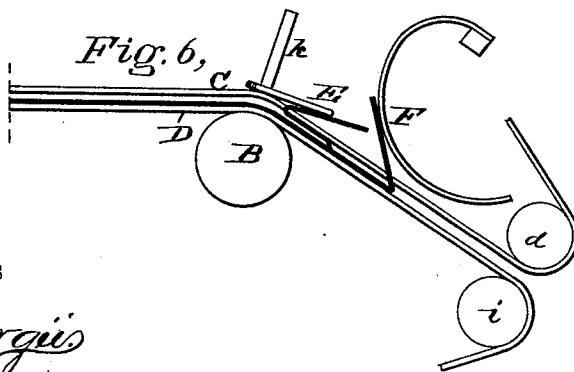
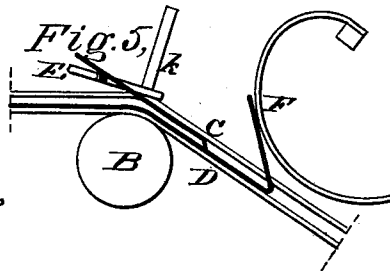
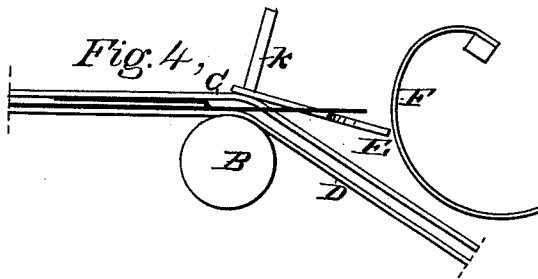
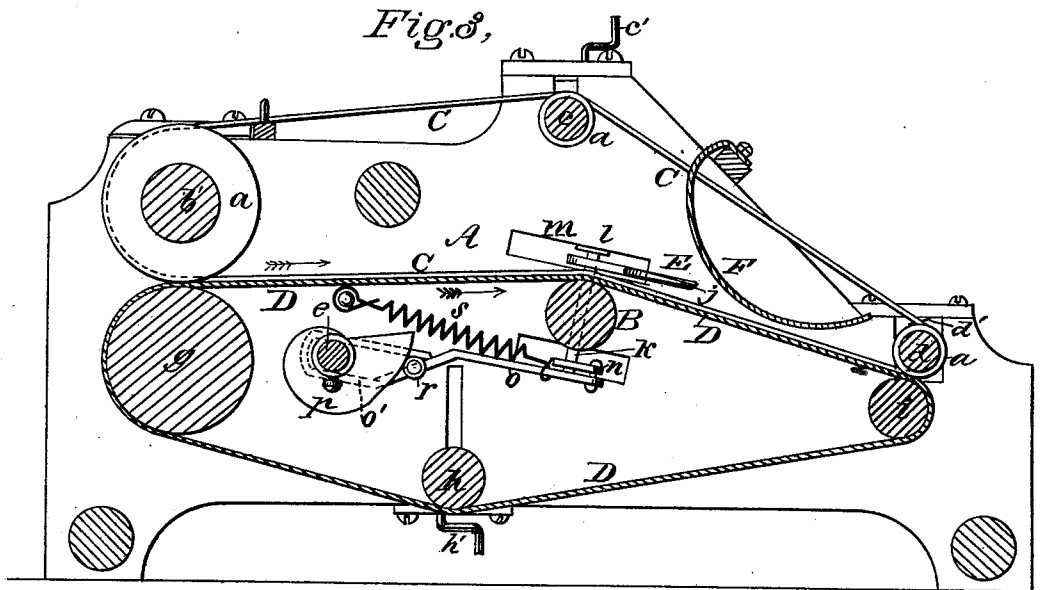
WITNESSES

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E. Erick*

INVENTOR.

Wm. C. Cross,
by M. Bailey
his ATTORNEY

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WITNESSES

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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. **222,465**, dated December 9, 1879; application filed November 10, 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 machinery for making satchel-bottom paper bags, and has particular reference to that portion of such machinery by which are formed the second and the final folds—that is to say, the fold made by turning over upon one another the two end flaps of the first or diamond fold.

My object is to provide a simple yet efficient mechanism for doing this work, which will not interfere with the continuous progression or forward movement of the blank or necessitate its stoppage.

My invention for this purpose may be stated to consist in the combination, with a roll or cylinder, which I term the “folding-roll” and “carrying-tapes,” which determine the line or extent of fold, of folders which sweep over the folding-roll in a path whose plane is tangential, or substantially so, with that part of the folding-roll on which the fold is made, and which I shall term the “folding-line.”

I prefer to cause the folders to move in a curved or circular path, to which end they may either vibrate back and forth or revolve in one direction only; but, whether vibrating or revolving, their plane of movement should be tangential, or thereabout, to the folding-line on the folding-roll.

To facilitate the conveying of the blank through the machine, I make use of an endless apron, between which and the guide-tapes the blank is held, and by which it is carried forward. This is one convenient way of feeding the blank along; but other means for the same purpose can readily be employed.

To enable others skilled in the art to understand and use my invention, I will proceed to describe the manner in which the same is or may be carried into effect, by reference to the accompanying drawings, which represent one form of mechanism in which my invention is embodied.

Figure 1 is a plan, Fig. 2 is a side elevation, and Fig. 3 is a longitudinal vertical central section, of so much of a paper-bag machine as is necessary to illustrate my inven-

tion. Figs. 4, 5, 6 are diagrams representing the blank and the fold-forming devices in the various positions which they occupy during the formation of the second and the final folds.

I have not deemed it necessary to show the mechanisms for forming the tubular blank, severing the same into bag-lengths, forming the diamond fold therein, and pasting the same. These mechanisms may be of any suitable description. I can use, for instance, a diamond or first-fold-forming mechanism such as shown and described in my Letters Patent No. 220,810, dated October 21, 1879, or in other Letters Patent about to issue to me, which will bear date of November 11, 1879. From either of these mechanisms the diamond-folded blank, with paste properly applied along the center lines of the diamond fold by appropriate devices, can be delivered to the mechanism which I am about to describe; or said blanks, properly prepared, may be fed thereto singly by hand or otherwise.

I proceed now to a description of the mechanism in which my present invention is embodied.

The working parts of the machine are supported in a frame, A, of suitable construction.

The folding-roll, to which reference has hereinbefore been made, is shown at B, supported in proper bearings in the frame. Over and bearing upon it run the two tapes C, which are the carrying or guide tapes by which the line or extent of fold is determined. They are endless bands, which pass around wheels or bosses *a*, fixed on shafts *b c d*. The shaft *b* is power-driven, deriving its movement from the driving-shaft *e* through gears or spur-wheels 1 2 3 4. The blank to be operated on (shown at *f* by dotted lines in Fig. 1) passes between these tapes and the folding-roll below, diamond fold uppermost. The blank is held at its side edges by the tapes, and those portions of the loose ends of the flaps of the diamond fold which are exposed in the interval between the two tapes are the parts which are to be folded in order to make the second and final folds. Consequently the distance between the tapes determines the size of fold, and by adjusting the tapes nearer to or farther from one another, as can readily be done by making the wheels or bosses *a* movable and adjustable lengthwise on their shafts, the size or extent of fold can be regulated as circumstances may require.

Shaft *c* is mounted in boxes which can be moved up or down by adjusting-screws *c'*, in order to stretch or relax the tapes as desired.

Any suitable device—as, for instance, a set of rollers—can be used in conjunction with the tapes to feed or carry along the blank through the machine. The device, however, which I prefer to use consists of an endless apron, *D*, mounted on and extending around rolls *g h i*, and also the roll *B*, passing between the latter roll below and the tapes *C* above.

The roll *g* is driven by gear 3, and the tapes and apron move in unison. Roll *h* is mounted in movable boxes controlled by adjusting-screws *h'*, for the purpose of tightening or relaxing the apron.

Shafts *b* and *d*, which carry the tapes, are mounted over the apron-rolls *g i*, and are supported in movable boxes, which are downwardly pressed by springs, such as *d'*, thus causing said shafts, or the bosses *a* thereon, to bear down upon the apron with yielding pressure. The blank enters between *b* and *g*, and is discharged from between *d* and *i*. The roll *i* is placed below the level of the folding-roll *B*, so that the apron has a downward inclination from *B* to *i*, as indicated plainly in Fig. 3.

The folders, hereinbefore referred to, are shown at *E*. They consist, in this instance, of two folding arms or blades, of approximately spear shape, having inclined edges *j*, which act on the blank. There is one arm on each side of the machine, arranged so that when standing at right angles with the frame they will be directly over the folding-roll and nearly touching the same, leaving, however, sufficient room for the passage of the apron and the tapes which intervene. They are of such length that their inner ends will nearly touch when in this position. The folders, in this instance, are adapted and arranged for vibratory movement. To this end each folder is attached to the upper end of an upright rocking standard or shaft, *k*, supported to turn in bracket-bearings *l*, fixed to the frame, as shown, the folder projecting into the interior of the machine through a suitable slot, *m*, in the frame.

From the lower end of the rock-shaft extends a radial arm, *n*, to which is pivoted or jointed a connecting-rod, *o*, provided at the other end with a yoke or longitudinally-slotted portion, *o'*, to straddle the driving-shaft *c*, on which is mounted a cam, *p*, which acts with its periphery against a roller stud, *r*, on said rod *o*. Springs *s s'*, one or both, hold the stud *r* against the cam with yielding pressure, and serve to turn the rock-shaft *k* in a direction opposite to that in which it is moved by the cam. This is one simple way of obtaining a vibratory movement of the folder; but obviously other means can be employed.

Both folders are arranged and operated in the same way, so that a description of one will answer for both. It will be noted that the folder rock-shafts *k* are set at a slight inclination from the perpendicular, so that the plane

of movement of the folders will be inclined from the horizontal, the object being to have them move in a plane which is inclined with respect to the apron both in rear and in advance of the roll *B*. The blades thus approach the apron most nearly at the point where they are about tangential to the roll, which point I term the “folding-line,” and as they move from that point in either direction they also depart from the apron. The folders move back and forth once to make the two folds, and their actuating mechanism is so timed as to cause them to thus move at the proper times in order to operate on the blank, as hereinafter described.

Between the folding-roll and the discharge end of the machine is an arm or shoe, *E*, which is attached to the machine-frame, and extends down therefrom in such position as to overhang the central portion of the blank, which passes beneath it. The function of this device is to hold down the folds and properly deliver the same to the final rolls *d i*, between which the folds are pressed down and the satchel-bottom is completed.

The operation of this mechanism is as follows, it being understood that the blank moves continuously and uninterruptedly through the machine while being operated on: The machine being in motion, with the parts moving in the direction indicated by the arrows, the blank *f*, with diamond fold uppermost, and with paste properly applied to it along the longitudinal center lines of the diamond fold, as indicated by the shade-lines in Fig. 1, is inserted point foremost between the rolls *b g*, and is fed along between the apron and the tapes. The movement of the folders is so timed that when the front of the blank reaches the immediate vicinity of the folding-roll the folders have moved forward to occupy the position shown in Fig. 1 and in side elevation, diagram Fig. 4. The folders retain this position until the points 5, at which the front flap of the diamond is held by the tapes, reach the folding-line on the folding-roll, at which time the folders will swing back on their axes, passing between the apron or tapes and the front flap, which, owing to the downward inclination of the apron in front of the folding-rolls, stands out or up away from the apron, as indicated in Fig. 4. The effect of this operation is to turn back and break down the front flap along a line which determines its line of fold; and after it is cleared by the folders it stands up in position to be wiped or smoothed down by the shoe *F*, under which it will subsequently pass. The blank continues to move along until the points 6, at which its rear flap is held by the tapes, come over the folding-line on the folding-roll, at which time the point of this flap (owing to the front portion of the body of the diamond held by the tapes between the points 5 and 6 being bent over the roll and down the inclined part of the apron) will stand up away from the body of the bag, as indi-

cated in diagram Fig. 5. At this time the folders move forward quickly, and, passing between the rear flap and the tapes, will fold this flap over on the lines 6 6. After making this fold they still rest on the flap to hold it down until the blank has moved far enough along to bring the front flap under the shoe, which presses or folds down said flap upon the rear flap as it passes out from under the folders. This position of the parts is represented in diagram Fig. 6. The two folds are held down by the shoe, which keeps them in position to properly enter between the final rolls *d i*, which press down the two folds and discharge the completed bag. One blank can follow another through the machine without pause or interruption. The folders strike the flaps obliquely, preventing them from puckering, and avoiding imperfect folds.

To make different sizes of bags all that is required is to move the tapes to or from one another, according to size, and to change the gear that drives the folder-operating mechanism, so that said folders shall move faster or slower, or rest for a longer or shorter time, as may be required.

In lieu of vibratory folders I can employ folders which rotate in one direction only. In this case I would use two folders on each side, arranged one above the other far enough to clear one another, preferably on the same axis, but so as to revolve in opposite directions. The set of folders revolving in one direction would make one fold, and the other set revolving in the opposite direction would make the other fold; or, in lieu of this arrangement, I can employ but one rotary folder on each side, in which case one would revolve in a direction contrary to that in which the other would revolve, and each would consist of a blade extending the width of the bag at least, and having, preferably, a  shape, the concave edge, or that edge with the re-entering center angle, being the edge which would act on the bag. I can also use rollers in or on the blades, in order to act with less friction. I do not, therefore, restrict myself to the

mechanical details herein shown in illustration of my invention; but

What I do claim, and desire to secure by Letters Patent, is—

1. The combination, substantially as hereinbefore set forth, of the carrying-tapes, an apron, or its equivalent, to operate with said tapes to effect the feed of the blank, the folding-roll, and folders arranged and operating, substantially as described, to sweep over the folding-line on the folding-roll in both directions in a plane tangential, or substantially so, to said folding-line.

2. In combination with the folding-roll, the folders arranged and operated to sweep back and forth over the folding-line on said folding-roll in a plane tangential, or substantially so, to the said folding-line, at the times and in the manner substantially as hereinbefore set forth.

3. The carrying-tapes and the folding-roll, in combination with the apron having its upper face inclined downward in front of the folding-roll, and the folders arranged to move over the apron in a plane at angles thereto and tangential, or substantially so, to the folding-line on the folding-roll, substantially as hereinbefore set forth.

4. The combination, substantially as hereinbefore set forth, of the folders, the folding-roll, the carrying-tapes, the apron, or its equivalent, and the shoe, the combination having the mode of operation herein described.

5. The carrying-tapes, apron, or its equivalent, and folding-roll, in combination with the vibratory folders, one on each side of the machine, arranged and operated to move simultaneously and together in a plane tangential to the folding-line on the folding-roll, to operate successively on the front and rear flaps of the diamond fold, substantially as set forth.

In testimony whereof I have hereunto signed my name this 8th day of November, A. D. 1879.

WILLIAM C. CROSS.

Witnesses:

G. C. HOAG,
J. L. BAILEY.