3 Sheets--Sheet 1.

L. C. CROWELL.

Paper-Bag Machines.

No. 143,674. Patented Oct. 14, 1873.

Fig. 1.

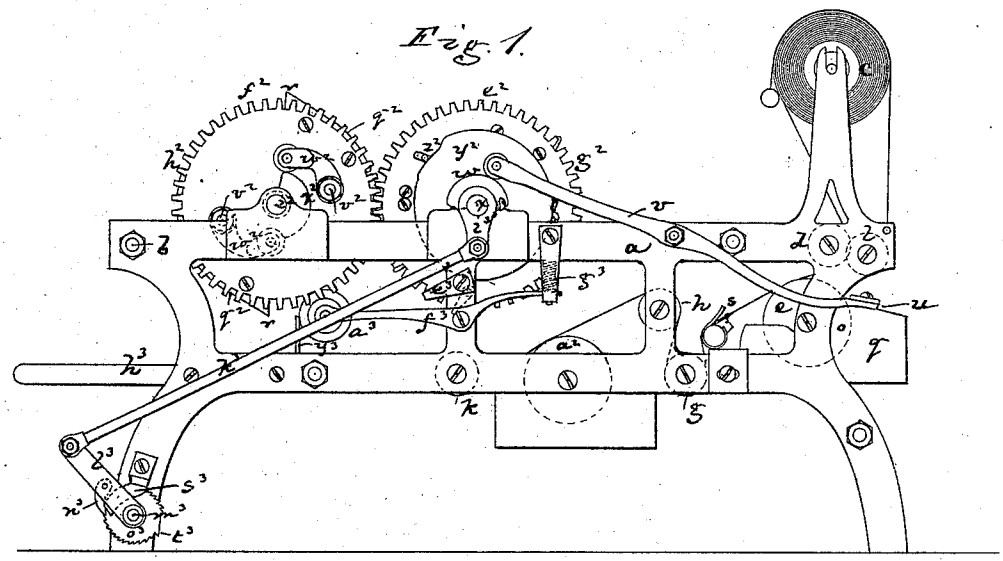
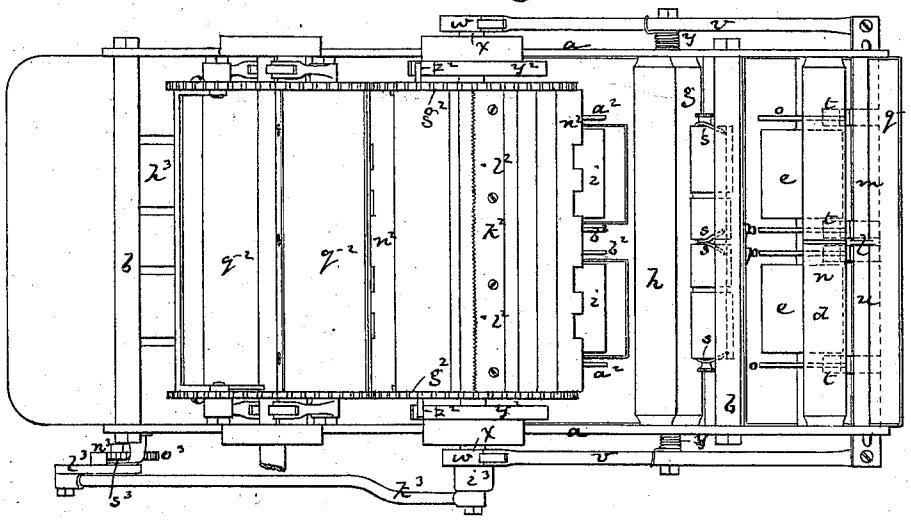


Fig. 2.



Witnesses.
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AM. PHOTO-LITHOGRAPHIC CO. N.Y. (OSBORNE'S PROCESS)

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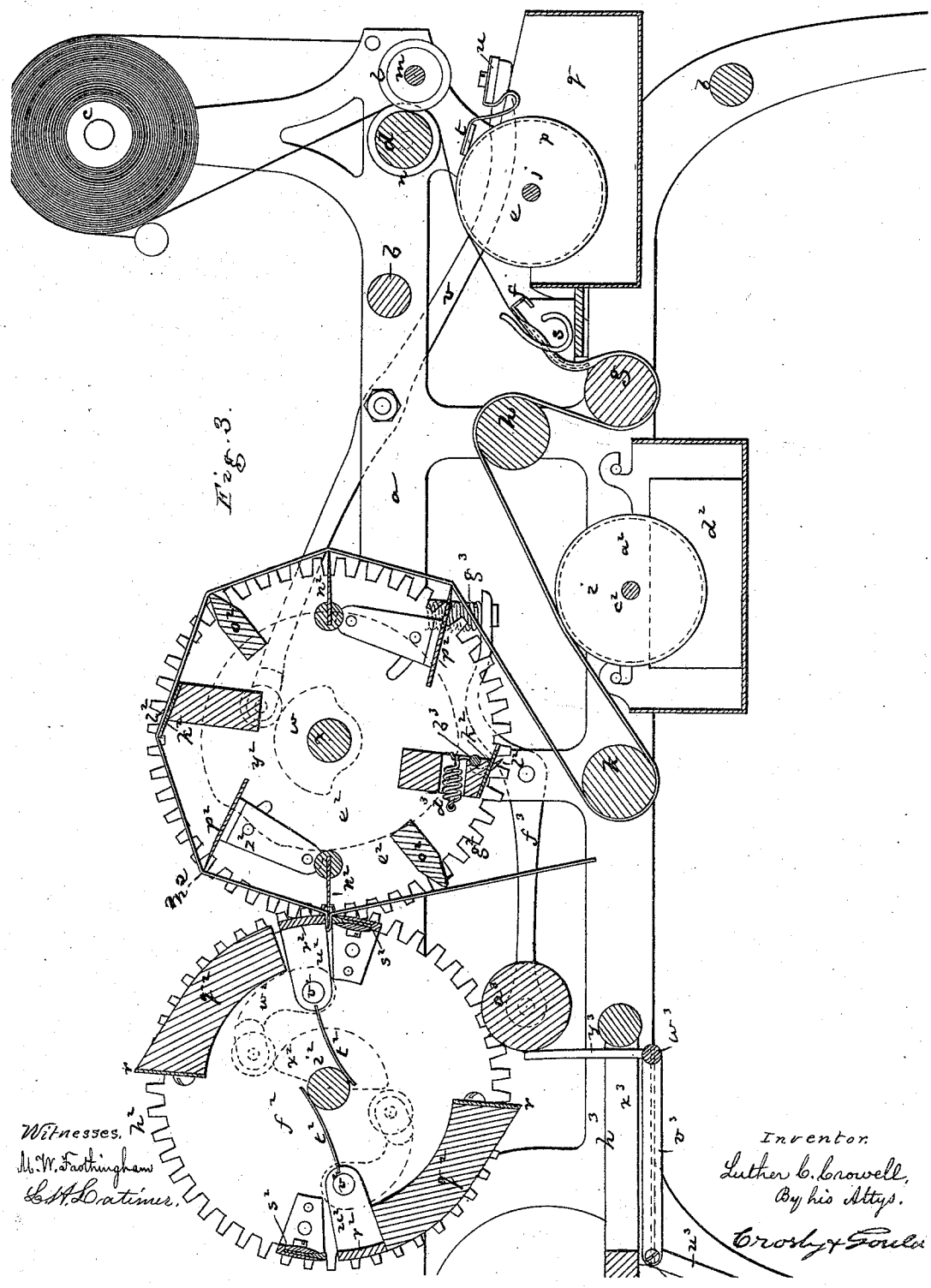

Fig. 3.

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L. C. CROWELL.

Paper-Bag Machines.

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Fig. 4

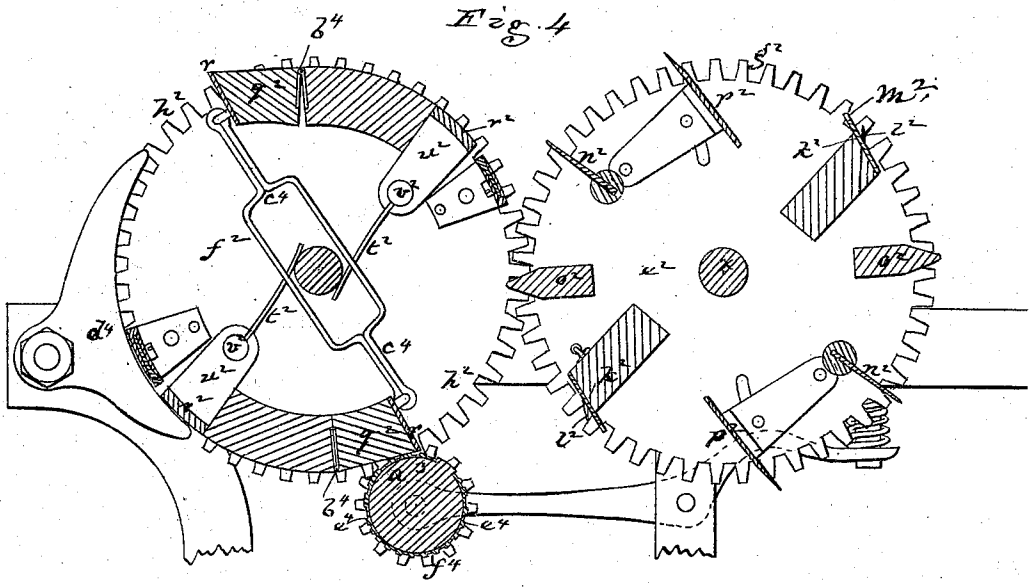
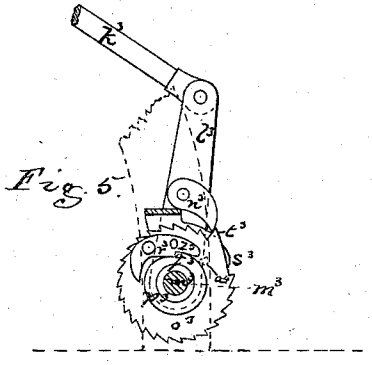


Fig. 5



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UNITED STATES PATENT OFFICE.

LUTHER C. CROWELL, OF BOSTON, MASSACHUSETTS.

IMPROVEMENT IN PAPER-BAG MACHINES.

Specification forming part of Letters Patent No. **143,674**, dated October 14, 1873; application filed August 25, 1873.

To all whom it may concern:

Be it known that I, LUTHER C. CROWELL, of Boston, in the county of Suffolk and State of Massachusetts, have invented certain Improvements in Paper-Bag Machines; and I do hereby declare that the following, taken in connection with the drawings which accompany and form part of this specification, is a description of my invention sufficient to enable those skilled in the art to practice it.

United States Letters Patent No. 137,533, dated April 8, 1873, have been granted to me for an improvement in the manufacture of paper bags, said improvement consisting, particularly, in forming bags from a continuous strip of paper by folding a narrow strip at each of the two opposite sides of the strip, applying paste on the inner surface of the folded edge for half of a bag-forming length of the paper, then applying cement on the outer surface of said folded edge for the whole or for half of the bag-forming length, then folding said length by a cross-fold at the center, so as to bring the respective folded edges at the respective sides together, the bag-length, or the length having the edges thus united, being severed from the continuous strip, and forming a bag having a whole or uncemented bottom, and having at each side inwardly-projecting edges, which, being pasted together to close the sides, are also pasted to one side, and to one side only, of the main portion of the bag. My present invention has particular reference to the organization of a machine for forming such bags; and the invention consists, primarily, in a combination of guide-rolls, paste-applying wheels, edge turning or folding devices, and devices for forming the center fold, bringing the two bag-forming halves together, and severing and delivering the bags made, as described.

The drawing represents an organization embodying my invention.

Figure 1 shows the machine in side elevation. Fig. 2 is a plan of it. Fig. 3 is a sectional elevation made double the size of Figs. 1 and 2. Figs. 4 and 5 are details.

a a denote the two uprights of a frame, connected by suitable cross-rods *b*, the frame supporting the various rolls and other mechanism. At one end of the frame is the paper-roll *c*, whose shaft turns in suitable bearings. From this roll the paper passes by and against a guide-roll, *d*, and thence by and against a cylinder, *e*, over plates *f*, to and under a guide-roll, *g*, to and over a guide-roll, *h*, over and against a cylinder, *i*, to and under a guide-roll, *k*, as seen in Fig. 3, to the center-folding, severing, and delivering mechanism; and in its progress, by these rolls and cylinder, its edges are folded over, and the cement is applied to and under such edges. In this operation, paper may be used of a width to form one bag, or a series of bags end to end, or in one line; or the machine may be made to form several lines of bags, side by side; and the drawing shows a machine designed to form, from one strip of paper, two series or lines of bags, side by side, the strip of paper being of the width of two bags plus the width of the four inwardly-folded edges at the opposite sides of the two strips cut from the single strip. The strip of paper, in running from the roll *c* by the roll *d*, passes to the action of a disk-cutter, *l*, fixed on a loosely-rotating shaft, *m*, the edge of the cutter playing in a peripheral groove, *n*, in the roll *d*, said roll being also a loose roll. The paper is thereby divided, and the two strips pass over twin cylinders *e* fixed on a loose shaft, *j*. Beyond the outer end of each cylinder, a paste-applying wheel, *o*, is fixed upon the roll, and beyond the inner end of each cylinder is a corresponding paste-applying wheel, *p*. The edges of the two wheels *o p* of each cylinder, as they rotate, dip into a paste-trough, *q*, and as the paper and the rolls come into contact the rolls apply paste to the paper, near to the edges thereof. After leaving its cylinder *e* each strip passes over a guide-plate, *f*, and between two curved fingers, *s*, which fingers extend over the opposite ends of the plate, and bend and fold under the opposite edges of the paper as the strip passes over the plate and down to the guide-roll *g*, the paper passing under the roll *g*, which causes the pasted edges to adhere to the main portion of the strip; the strips with the folded edges then passing over the guide-roll *h* to the cylinders *i*. The paste-wheels *o p* take from the paste-trough a constant supply of cement; but for each bag-forming length, paste is only to be applied to half of such length. I therefore

provide for scraping the paste from each wheel-edge intermittently and automatically, so that for each bag-length paste will first be applied to half of such bag-length, and then the paste will be stripped from the wheel-edge, so that in its continued contact with the paper no paste will be applied to the paper for the other half of such bag-length. For this purpose I combine with each roll a doctor or scraper, t, fixed to and extending from a bar, u, which bar is shown as fixed to the outer ends of levers v, whose inner ends, which may have rolls, are intermittently operated by cams w on a shaft, x. The bar u may be raised by a spring, y, when the paste-wheels are to be free from the doctors; but when the cams act upon the levers they force down the bar u, bringing the scrapers or doctors into contact with the paste-wheel edges, so that they strip the paste therefrom, and prevent their applying paste to the paper. The paste-wheels in fact apply paste for a length of paper sufficient to form a bag, and then omit to paste for a corresponding length; but as the bag-lengths are severed alternately half-way between the pasted portion, and then half-way between the unpasted portion, the result is that half of each length is pasted and half unpasted. The opposite edges being then folded by the fingers s, the pasted portion will be cemented to the body of the strip, leaving the unpasted portion free or loose. From the roll h each strip with its folded and half-pasted edges passes over a cylinder, i, and over two paste-wheels, a^2 b^2, at the opposite ends of such cylinder, the cylinder and wheels being fixed on a loosely-rotating shaft, c^2, and the paste-wheels being just beyond the ends of the cylinder and dipping into a paste-trough, d^2. The lapped or folded edges of the strip being undermost, the wheels are so placed that these edges ride over the wheels, which apply a continuous line of paste to the outer surface of such edges. The paste might be applied only to half of the length of edge of each bag-forming length, but it is more readily applied continuous or to the whole length. From the paste-wheels each strip passes under the roll k, and thence up against the back of a cylinder, e^2, and over said cylinder down between it and another cylinder, f^2. The cylinder e^2 is fixed upon the shaft x, and has gears g^2 meshing into and driven by gears h^2 at the opposite ends of the cylinder f^2, which latter cylinder is fixed upon the driving-shaft i^2. The cylinder e^2 has extending across it two cutter-bars, k^2, from which project pins l^2, and the pins of each bar in turn take the paper near the end of one bag-forming length, (the paper being subsequently seized by the teeth m^2 at the edge of the bar,) and draw it forward as the cylinder rotates. The cylinder e^2 also carries two folder-bars, n^2, placed midway between the bars k^2, and also two guide-bars, o^2, and two slacker-bars, p^2. The other cylinder, f^2, has two guide and bed plates, q^2, at one edge of each of which is a movable jaw-plate, r^2, and adjacent to the outer edge of each plate r^2 is a stationary jaw, s^2. As the cylinders rotate the edge of each folder-bar n^2 passes between the edges of the jaws r^2 s^2, said edges being open, and closing as the plate enters. The jaw r^2 is held open normally by suitable springs t^2 acting against arms u^2 extending from the jaw, said arms being pivoted at v^2; and from one or each pivot extends an arm, w^2, that, as the jaw r^2 and jaw s^2 come together, strikes a stationary cam, x^2, and closes the jaws, holding them closed until the arm passes the cam, the springs t^2 then forcing them open. As the paper passes to the cylinder e^2 it is impaled upon the pins l^2, and such pins draw it forward, laying it over the edge of the folder-bar n^2, the edge of the bar meeting the paper at half the length of the portion thereof to form a bag. As the cylinders rotate, this edge presses the paper between the open jaws r^2 s^2, and said jaws immediately close upon the paper, the bar p^2 yielding to slacken the paper as the bar n^2 enters the jaws. Said slacker-bar p^2 is held out by two stationary cam-wheels, y^2, until the folder-bar n^2 enters the jaws, pins z^2 at the ends of the bar sliding over the outer portions of the wheels as, or just before, the folder-bar enters the jaws, the pins dropping inward to a portion of the wheels of less diameter, thereby producing the slack of the paper required in its entering between the jaws r^2 s^2. Before the pins l^2 again seize the paper, the slacker-bar is again thrown out. The jaws, having nipped the paper at the center of a bag-forming length, draw the fold around with the cylinder until the fold passes between the curved outer surface of the guide and bed plate q^2 and a presser-roll, a^3, and, as the fold reaches this roll, the jaws open and let the fold free, the folded paper being then drawn back by the roll and cylinder. To permit the impaled edge of the paper to move back, such edge may be simply torn from the impaling-pins, or they may be automatically withdrawn. To withdraw the pins they may be made to extend from a rod, b^3, having an arm, c^3, the bar being held in position to project the pins by a spring, d^3, and the arm c^3 striking a stop, e^3, as the jaws r^2 s^2 seize the paper, the stop turning the rod and causing the pins to retreat into the bar. As the paper passes to the presser-roll a^3 the edge of the severing-bar presses the paper over the projecting edge r of the plate q^2, severing the paper over such edge, the bar being preferably provided with jaw-teeth to insure the cut. As this edge r necessarily projects beyond the concentric surface of the cylinder, the presser-roll a^3 is so hung as to yield when this edge passes it, for which purpose it may be journaled upon levers f^3, having springs g^3, that yield as the plate strikes and passes the roll. The roll may, however, be journaled in stationary bearings, in which case the plate q^2 will be arranged to yield. As the paper passes between the roll a^3 and plate its folded and cement-applied edges will be brought

into contact at the respective opposite sides of the paper, thereby completing the bag, which, as it passes beyond the roll a^3, is dropped upon a table, h^3.

To count the bags as they are delivered I combine with the machine a mechanism by which the bags, as they are piled or delivered by the roll, shall be pressed forward whenever the accumulation reaches a certain number. For this purpose I prefer to use a mechanism substantially as follows: At one end of the shaft x is fixed a crank-arm, i^3, connected by a link, k^3, to an arm, l^3, jointed loosely to a rocker-shaft, m^3. Jointed to this arm is a pawl, n^3, resting against a ratchet-wheel, o^3, which is also loose upon the shaft, and is, or may be, held by friction. Fixed upon the shaft m^3 is a wheel, p^3, as seen in Fig. 5, having in its periphery one notch, q^3, into which, at proper times, drops a drag-pawl, r^3, pivoted to the inner side of the ratchet-wheel. At the outer side of the ratchet-wheel is a stationary guard-plate, s^3, having a rim concentric with the outer edges or points of the ratchet-teeth, and extending just beyond such teeth. The ratchet, however, has one tooth, t^3, which extends beyond the others, and when the pawl r^3 comes over such tooth it meshes into it.

At each rotation of the cylinder f^2 and shaft i^2, a certain number of bags are formed and delivered, (the mechanism shown being designed to make two bags in line and two lines of bags;) and at each rotation the pawl-arm l^3 is thrown forward, and the shield or guard s^3 holds the pawl n^3 out of contact with the ratchet until near the end of its stroke; it then, passing beyond the shield and engaging with a tooth of the ratchet, turns the ratchet the space of one tooth. This it continues to do until the ratchet reaches such position that the pawl, in its back stroke, drops over or back of the projecting tooth t^3, when the pawl will move the ratchet during the whole of its forward stroke.

Projecting from the rocker-shaft m^3 is an arm, u^3, connected by a link, v^3, with a slide-bar, w^3, from which extend, through slots x^3 in the table h^3, pins y^3, the bar w^3 sliding in suitable ways. The long tooth t^3 is so located, with respect to the pawl r^3 and the wheel p^3, that, as the pawl n^3 drops behind the tooth t^3, the pawl r^3 catches into the notch q^3, and, as the pawl n^3 moves forward, the pawl r^3 drags with it the wheel p^3, which, being fixed upon the shaft m^3, turns said shaft and draws forward the slide w^3 and its pins y^3. The bags, as delivered by the roll a^3, drop in front of these pins y^3, and, when the pins y^3 move forward, they push forward the pile or piles of accumulated bags; and as this takes place once during the rotation of the wheel t^3, and this wheel is turned at each rotation of the cylinder, it follows that the piles are pushed forward whenever a given number of bags have been formed.

In the mechanism shown, the ratchet has twenty-five teeth, and, as four bags are formed at each rotation of the cylinder, the pins y^3, at each advance, will press forward one hundred bags, in two piles of fifty each, side by side. This obviates all necessity of counting the bags, or of providing the machine with a stop-motion to stop the machine when a certain number of bags have been made, as, by my method, the machine can keep at work indefinitely, the accumulating piles being pressed forward, and being removed by an attendant whenever desirable.

As the pawl r^3 moves forward and is reaching the end of its stroke, a pin, z^3, extending laterally from it, strikes a stationary pin, a^4, which raises the pawl from its notch, and a suitable spring then returns the shaft m^3, slide w^3, and pins y^3 to their normal positions.

The machine may be made with provision for printing each bag, and for this purpose the plates are, preferably, arranged to yield, and the roll a^3 will be provided with types e^4, all as shown in Fig. 4. In such arrangement, each bed or cutter plate q^2 is hinged, as seen at b^4, and the two are connected by a link, c^4. When the paper strikes the roll a^3, said roll forces in the plate q^2, over which the paper is drawn, and, in forcing it in, forces out the opposite plate. After the plate passes the roll, it is held in (to hold the opposite plate in position for the action of the cutter-bar) by guides d^4, under which the ends of the plates pass after leaving the roll. To insure proper rotative movement of the roll a^3 when the types e^4 are used, it is provided with a gear-pinion, f^4, meshing into and driven by the gear h^2. The types may be supplied with ink by any suitable inking mechanism.

In the operation of the machine, the strip of paper passes from the paper roll c over a guide-roll, d, and thence over the cylinder e, bringing its under surface, at the edges, into contact with the perimeters of the paste-rolls o p, said rolls applying paste intermittently, as before described, or so that only half of each bag-forming length is pasted by them. Then, as the paper passes between the fingers s, they form a narrow fold, which fold, in the paste-applied part, will adhere to the surface against which it is folded, as the paper continues its progress by the guide-rolls g h. From the roll h the paper passes over the cylinder i, and the outer surface of the folded edges passes against the perimeters of the paste-rolls a^2 b^2, by which paste is continuously applied to such surfaces. Thence the paper passes to and under the guide-roll k, to and over the cylinder e^2, down between it and the cylinder f^2, being by said cylinders doubled or folded at the center of each bag-forming length and severed for such length, and the paste-applied edges being brought together and adhering to form the bag, the completed bag being delivered upon the table h^3, from which the accumulating bags are removed by the pins y^3.

I claim—

1. In combination with the paste-wheels o p,

the doctor-bar t, intermittently brought into contact with such wheels, substantially as described.

2. The combination of the ratchet o^3, pawl n^3, guard s^3, pawl r^3, wheel p^3, and rocker-shaft m^3, for operating the bag-removing mechanism, substantially as described.

3. The combination of the paste-rolls o p, the intermittently-acting doctor t, the folding-fingers s, and rolls h g, substantially as and for the purposes set forth.

4. The combination of the paste-rolls a^2 b^2 with the cylinders e^2 f^2, substantially as shown and described.

5. The cylinder e^2, provided with the folder-bars n^2 and cutter-bars k, in combination with the cylinder f^2, and its jaws r^2 s^2, and edge v, substantially as shown and described.

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