4 Sheets—Sheet 1.

O. E. DAVIDSON.

Paper-Bag Machine.

No. 219,920. Patented Sept. 23, 1879.

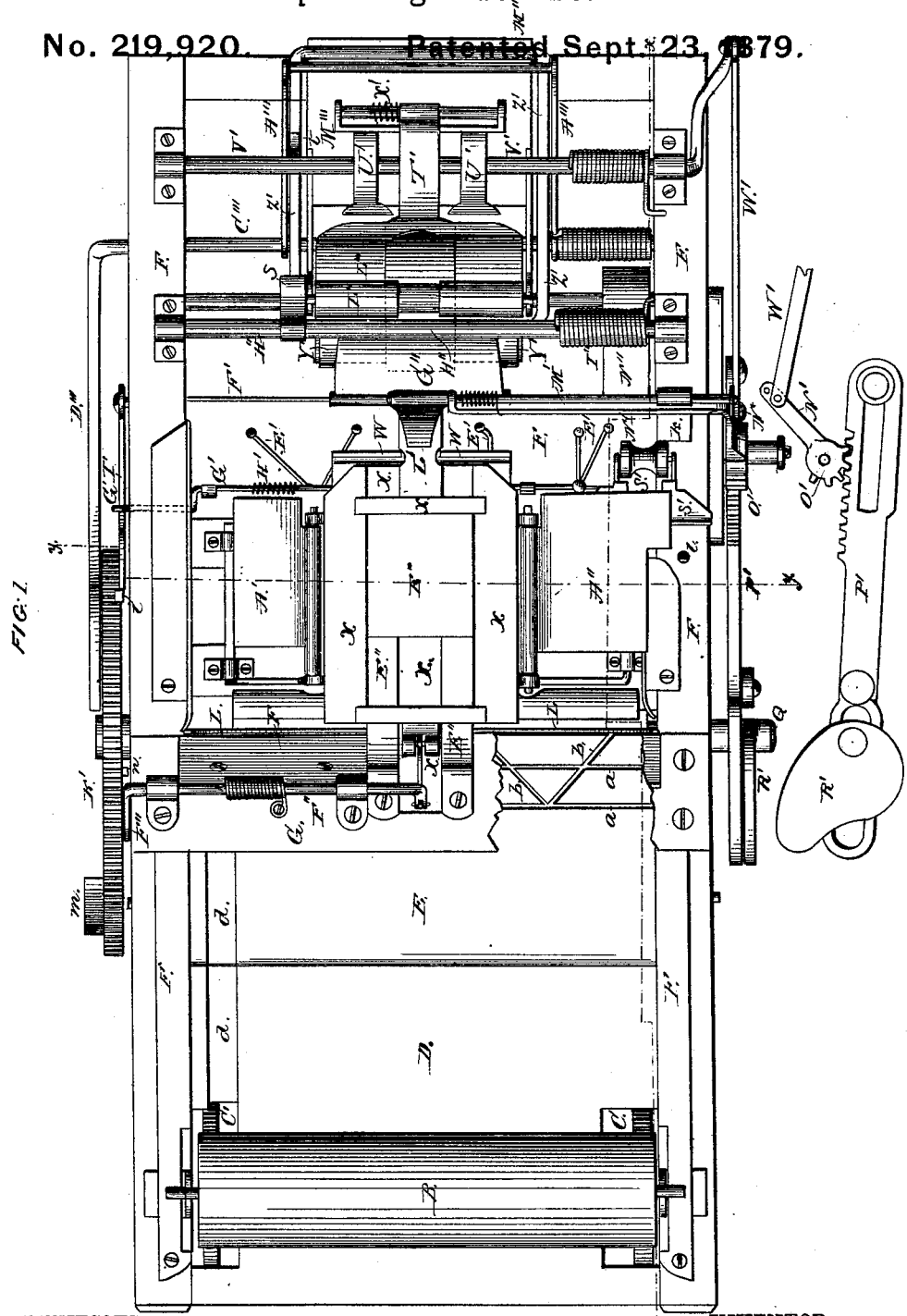


FIG. 1.

WITNESSES:

John F. C. Frenkert

Amos W. Hart

INVENTOR:

O. E. Davidson

BY Munn & Co

ATTORNEYS.

O. E. DAVIDSON.

Paper-Bag Machine.

No. 219,920. Patented Sept. 23, 1879.

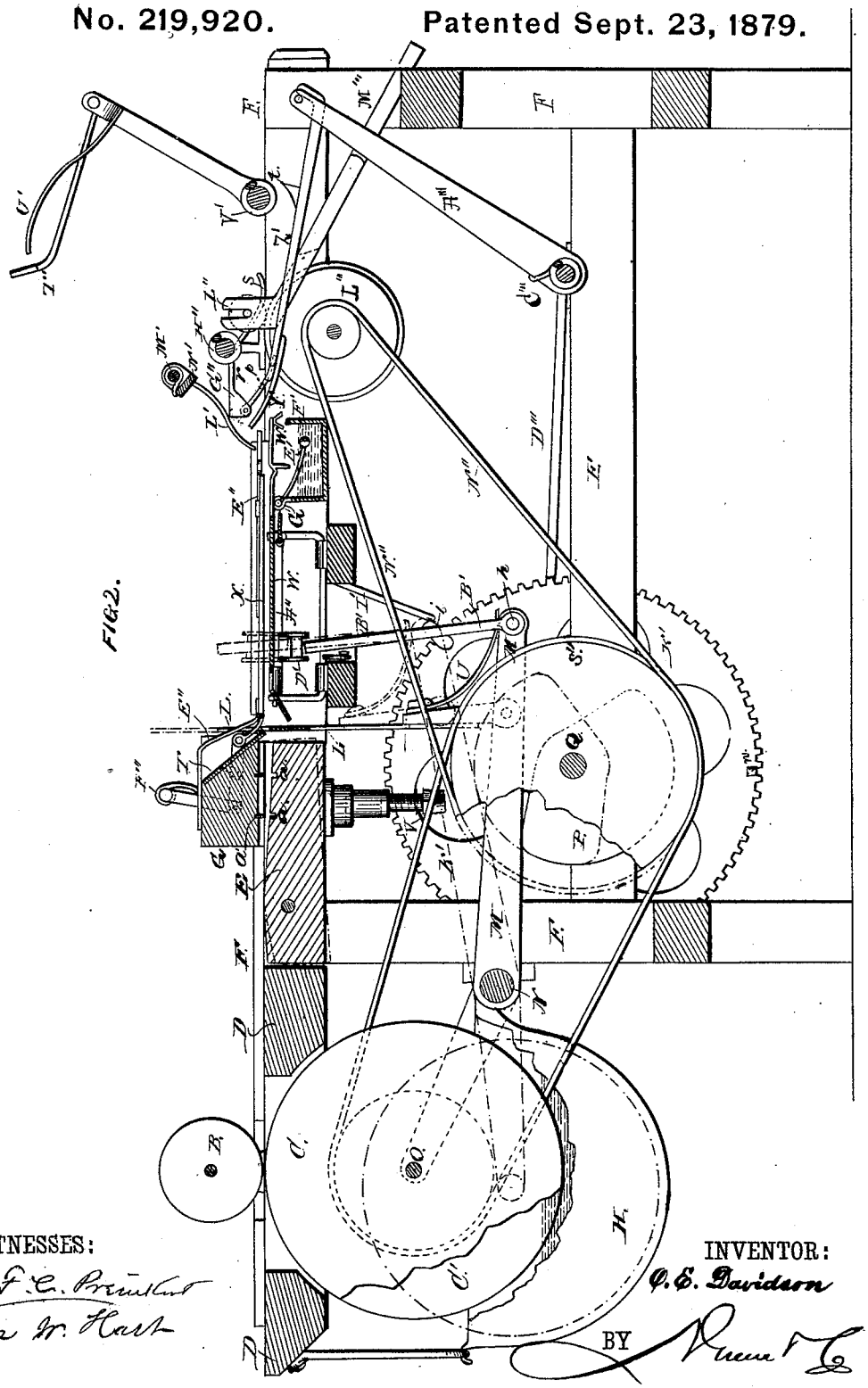


FIG 2.

WITNESSES:

John F. C. Brinckerhoff

Amos W. Hart

INVENTOR:

O. E. Davidson

BY Munn & Co

ATTORNEYS.

4 Sheets—Sheet 3.

O. E. DAVIDSON.

Paper-Bag Machine.

No. 219,920. Patented Sept. 23, 1879.

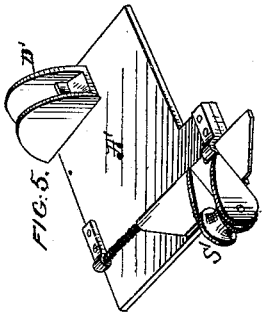


FIG. 5.

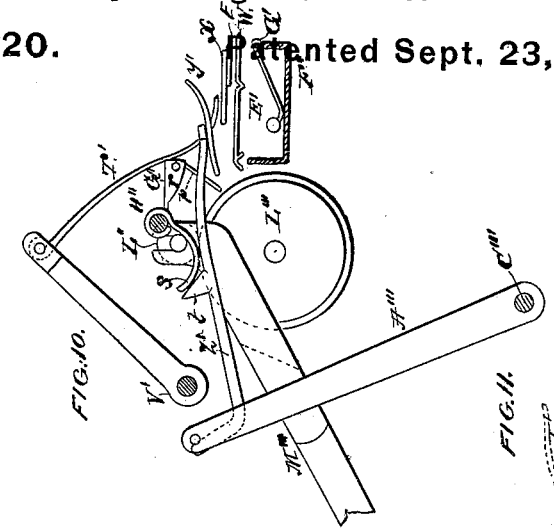


FIG. 10.

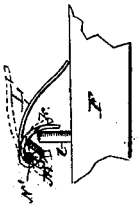


FIG. 11.

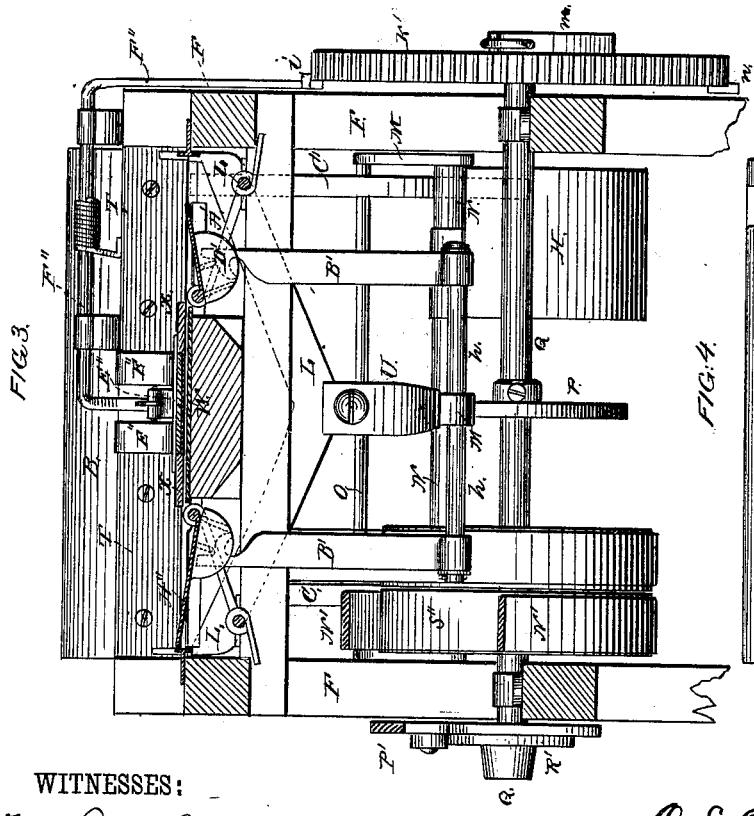


FIG. 3.

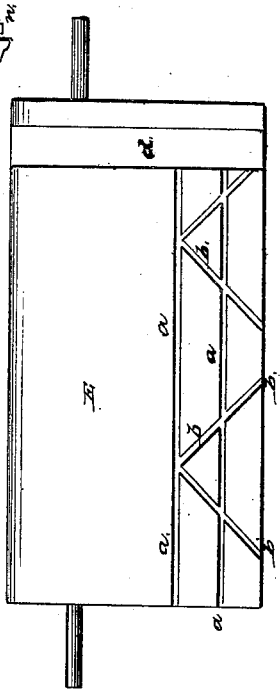


FIG. 4.

WITNESSES:

John F. C. Brinckerhoff

Amos W. Hart

INVENTOR:

O. E. Davidson

BY Munn & Co

ATTORNEYS.

4 Sheets—Sheet 4.

O. E. DAVIDSON.

Paper-Bag Machine.

No. 219,920. Patented Sept. 23, 1879.

FIG. 6.

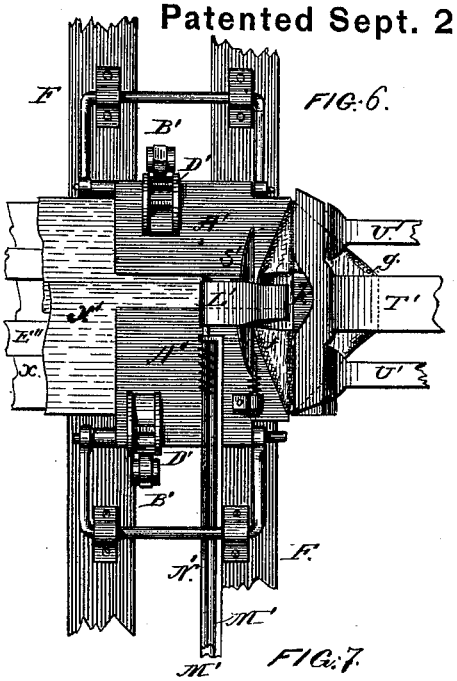


FIG. 12.

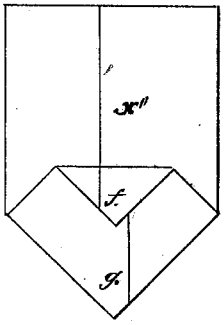


FIG. 7.

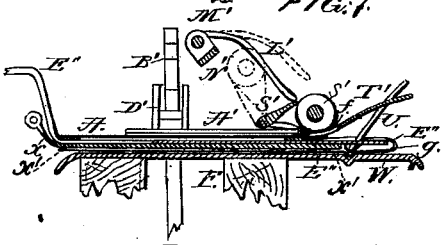


FIG. 13.

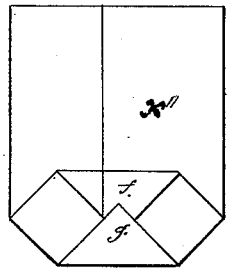


FIG. 8.

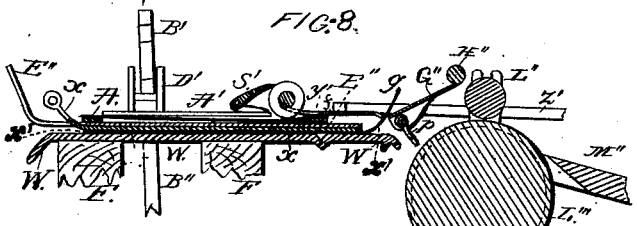
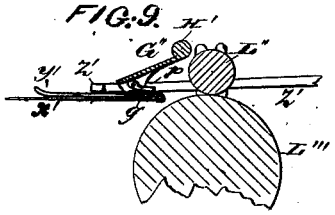


FIG. 9.



WITNESSES:
John F. C. Printhurst
Amos W. Hart

INVENTOR:
O. E. Davidson
BY Munn & Co
ATTORNEYS.

UNITED STATES PATENT OFFICE.

OTIS E. DAVIDSON, OF CLARKSVILLE, TENNESSEE.

IMPROVEMENT IN PAPER-BAG MACHINES.

Specification forming part of Letters Patent No. **219,920**, dated September 23, 1879; application filed June 6, 1879.

To all whom it may concern:

Be it known that I, OTIS EVERETT DAVIDSON, of Clarksville, in the county of Montgomery and State of Tennessee, have invented a new and Improved Paper-Bag Machine; and I do hereby declare that the following is a full, clear, and exact description of the same.

This invention is an improvement in the class of paper-bag machines adapted to form satchel-bottomed bags having a single lengthwise seam or lap.

The invention consists in novel mechanism for feeding and pasting, and also creasing, the continuous web of paper, and for cutting off blanks therefrom, and folding, pasting, and pressing the latter, and discharging them from the machine as completed bags.

In the accompanying drawings, forming part of this specification, Figure 1 is a plan view of the machine. Fig. 2 is a longitudinal vertical section of the machine on line *x x* of Fig. 1. Fig. 3 is a vertical cross-section on line *y y*, Fig. 1. Fig. 4 is a plan view of the pivoted or tilting table section detached. Fig. 5 is a perspective view of a side-folding flap and end-folding flap attached thereto. Fig. 6 is a detail plan; and Figs. 7, 8, 9, 10, 11, detail sections in a vertical plane, showing the folding mechanism in different positions which it assumes in practical operation. Figs. 12 and 13 are side views of bag partly completed and completed, respectively.

The continuous paper strip or sheet (drawn from a web or roll, not shown) from which the bag-blanks are cut, passes between an idle roll, B, and positive feed-wheels C C′ upon a table, D. The forward or inner end, E, of said table is a separate section, and pivoted in the side bars of the frame F. Two parallel transverse grooves, *a*, and short diagonal lines *b*, crossing these at right angles to each other, are formed in the face of this section E, Fig. 1, and corresponding ribs *a′*, Fig. 2, are attached to the under side of the cross-bar G, beneath which the sheet passes to the bag-forming mechanism proper, so that when the said pivoted section E is tilted, as will be presently described, the sheet will be pressed up against the said cross-bar, and creased, as required, to adapt it for subsequent folding.

The feed wheels or disks C C′ project up through slots in table D, so as to come in frictional contact with the sheet when they are elevated and rotated, as hereinafter described, for intermittently feeding and pasting the sheet.

The left-hand disk, C′, rotates in a paste-trough, H, and thus applies paste to the edge of the sheet at the same time that it assists in feeding it forward. The left-hand side of the table D and tilting section E is provided with a groove, *d*, to prevent removal of the paste by contact of the sheet with the table and section as the sheet advances.

The V-shaped cutter L acts in alternation with the feed-wheel C C′, so that it rises and severs a blank from the continuous sheet at the moment said wheels cease to feed the latter. The shank of the cutter L is pivoted to the longer arm of a horizontal lever, M, fulcrumed at N, and the shaft O of feed and paste wheels C C′ has its bearings in the shorter parallel arms of said lever. Thus the oscillation of the lever M causes wheels C C′ to rise and come in contact with the sheet, and the cutter L is simultaneously lowered, and, vice versa, when the cutter rises the wheels are lowered.

The lever is operated by the cam P, fixed on the middle of driving-shaft Q, so that the lever is vibrated at each rotation of the latter.

The two positions of the feed-wheels and cutter are shown in Fig. 2, full and dotted lines. The feeding and pasting wheels C C′ are rotated continuously by a band, R, which runs on pulleys S fixed on driving-shaft Q.

The knife or cutter L is held against the fixed inclined knife-plate T, attached to cross-bar G, by means of a plate-spring, U, whose free end bears on the lever M, as shown in Fig. 2, so that when the cutter is forced upward it will neatly sever a bag-blank from the sheet.

The operation of the lever M, as above described, also causes the section E to tilt when the cutter L rises, so that the sheet is creased simultaneously with the severing of the bag-blank. This action of the section E is effected by contact of its pendent stud V with the longer arm of lever M. Said stud is screw-threaded, and works in a corresponding socket, so that it may be adjusted to vary the press-

ure of the lever on the section E, and thereby cause the sheet to be creased more or less deeply.

I will now proceed to describe the mechanism by which the blanks, successively severed from the sheet by the cutter L, are folded, pasted at the end, and gradually formed into complete bags, and the latter discharged from the machine.

As a preliminary to a detailed description, I will state that after the sheet has passed beneath the fixed knife-plate T it enters a narrow space between the horizontal folding-table W and the former X, which is supported parallel thereto.

The folders or flaps A′ A″ are hinged somewhat loosely at the sides of the table W, and are thrown over upon the former X, to fold in and lap the sides of the bag-blank, by means of arms B′, having their upper ends notched to engage with flanged mutilated gears or pinions D′ on the flaps A′ and A″. These arms B′ stand vertical, and are attached to the ends of a transverse bar, *h*, which forms part of the lever M. Hence the arms B′ will rise and operate the folders A′ A″ simultaneously with the action of the cutter L; and since the form of the latter enables it to begin to sever the blank at the edges, and to cut thence inward toward its middle, it will be seen that such form and action of the cutter have a peculiarly important relation to the time and manner of operation of the folders A′ A″, so that the latter turn the sides of the blanks inward while they (the blanks) are being divided from the sheet.

The folder A′ acts first, or slightly in advance of the other one, A″, so that the pasted edge of the blank is folded on the former X just before the other edge. The folder A″ then presses the lapped edges together and causes them to adhere.

Just as the arms B′ begin to rise to operate the folders A′ A″, the pasters E′ are caused to rise and apply paste at different points on the end and under side of the blank. Said pasters consist of arms having plates or cups attached to their free ends, which rest in the paste-trough F′. The pasters are attached to a crank-rod, G′, encircled by a spiral spring, H′. The crank or bent arm of the rod G′ is depressed at each revolution of driving-shaft Q by a pivoted lever, I′, which comes in contact with an arm, *i*, on the large gear K′, mounted on the driving-shaft Q. Thus the wheel K′ raises the pasters E′ out of the trough F′, and the spring H′ throws them down again until the wheel K′ has made another revolution.

The tongue L′ is a curved plate fixed on the inner end of a spring-encircled rotatable rod, M′, having its bearings in a right-angular arm, N′. This arm is rigidly connected with a pinion, O′, which is mounted on a stud that projects from the side of the frame F. A slotted sliding rack-bar, P′, engages said pinion O′, and is itself operated by a cam, R′, on the driving-shaft Q. Thus the arm N′, the rod M′, and the tongue L′ carried by it are thrown forward once in each rotation of the driving-shaft, and the tongue thereby caused to open the end of the paper tube. The tongue L′ raises the spring-flap S′ along with the edge of the paper tube, Fig. 6, and the notched blade or presser-foot T′ is thrown forward and folds inward and flattens the sides of the tube, so that it assumes the appearance shown in said Fig. 6.

The movement or operation of the tongue L′ progresses until the tappet *k* of rod M′, Fig. 11, strikes upon the stud *l*, fixed vertically in the frame F, which causes the tongue to release the flap S′, so that the latter turns the upper corner of the tube down and holds it while the foot T′ withdraws.

I have omitted to state that the flat fingers U′ act simultaneously with the blade or presser-foot T′, and press the folded end of the tube into a transverse groove in the end of the folding-table W, thus duly creasing the tube preparatory to the final fold.

The blade T′ is hinged, and the fingers U′ are fixed on the arms of an oscillating rock-shaft, V′, whose bent arm or crank is connected with the angular arm N′ by a rod, W′. Thus the blade T′ and fingers N′ are operated, like the tongue L′, by the rack-bar P′, pinion O′, and cam R′.

The blade T′ has a spring attachment, X′, which allows it to yield as it presses, as above described, upon the folded end of the paper tube.

As the blade T′ and fingers U′ rise, the plates Y′ slide in over the end of the tube. These plates are attached to rods Z′, which are hinged to arms A‴, that are rigidly attached to a rock-shaft.

A spiral spring, C‴, encircles one end of the shaft, and holds the arms A‴ thrown back until the rotation of the large spur-gear K′ brings its tappet or wing *m* into contact with the bent end of the arm D‴ of the shaft, thus depressing said arm and turning the shaft about a quarter of a revolution, which carries the plates Y′ forward, as before described. So soon as this has been done, the former X is moved onward.

The former is slotted, and slides on a fixed plate, E″. It is operated by a crank, F″, having its bearings on cross-bar G. The former X is connected to the short arm of the crank F″, and the longer arm of the latter is pendent in such relation to the gear K′ that when the latter rotates its cam or projection *n* will act on the arm and move the former.

When the former thus slides onward it necessarily carries the tube or partly-completed bag with it, and when it reaches the limit of its movement the blades Y′ begin their receding movement, and in doing so engage the folded portion of the bag-tube and draw it off the former X and beneath the flap G″. The latter consists of two parts—a hinged spring-plate, *p*, and a plate, *r*, which is rigidly attached to a cross-shaft, H″, or rod, which is

encircled by a spiral spring, I″, and provided with a tappet, *s*.

When the plates Y′ slide forward, Fig. 10, an inclined or beveled lug, *t*, on the bar Z′ raises the tappet *s*, and thereby rotates the rod H″ a part of a revolution, thus throwing the plate G″ downward, as shown in Fig. 8, against the tension of the spring I″, so that when the catch-plates Y′ recede, as before described, the lower point, *g*, of the tube end will slide upon the plate G″ and be turned partly backward, Fig. 8. When this has been accomplished the plate G″ rises in time to allow the tube to pass under it, when the pressure of the hinged spring-flap *p* upon the said lower corner of the tube turns it completely backward, and holds it momentarily flat upon the bottom of the now completed bag. The bag then passes between the finishing-rolls L″ L‴, by which it is flattened and smoothed, and is finally discharged upon the inclined table M‴, whence it passes into any suitable receptacle. (Not shown.)

The roll L″ is an idler; but the lower roll, L‴, receives positive motion by the belt N″ from the pulley S″ on the driving-shaft Q.

It will be seen from the foregoing description that the pasters E′, tongue L′, presser-foot T′, and fingers U′, catch-plates Y′, former X, and final-fold flap G″ are all operated or brought into positive action by the cams of spur-gear K′ acting on the several tappets, and that all of said devices are retracted or drawn back to their original quiescent position by means of springs.

The operation of the machine may be briefly recapitulated as follows: The paper sheet is fed over the table D, and at the same time pasted on one edge by wheels C C′. This is effected during a part of the revolution of the driving-shaft Q. As the latter completes its revolution the cam P raises the inner or longer arm of lever M, and thereby tilts the section E and creases the sheet, while the cutter L simultaneously severs the portion of the sheet which has passed beyond the cross-bar G. This severed portion constitutes the bag-blank, which is formed first into a tube, X′, and next into a bag, Y″, while the wheels C C′ are again operated to paste and feed the sheet A, as before.

The first steps of the bag-forming operation are the application of paste to the end of the blank by arms E′, and the folding inward of the sides of the blank by flaps A′ A″. Both these devices, E′ A′ A″, operate together with the cutter L. The flaps A′ A″ form the blank into a tube, X′, Fig. 6. The tongue L′ then opens the creased end of the tube, and the notched blade or presser-foot T′ immediately follows and carries the sides of the end of the tube inward and presses them flat upon the former X. The fingers U′ at the same time press the folded-in sides of the tube into a groove formed in the rear end of the folding-table W, and thereby crease the same preparatory to the final fold. The tongue L′ then releases the spring flap or folder S′, which is hinged to the end of side-folder A′, and allows it to turn over and press down the first corner or point, *f*, of the tube end, Fig. 4. Then the blade L′ slips out from under the flap S′, and the sliding plates Y′ pass in over the bottom of the tube or partially-completed bag X′, and the former X slides back, carrying the tube with it, so that as the plates Y′ recede they will engage the first fold, *f*, and draw the tube with them, first against (Fig. 8) and then beneath (Fig. 9) the hinged flap or plate G″, by which the lower corner, *g*, of the tube is folded upward and pressed flat upon the square bottom of the tube, thus completing the bag X″ in the form shown in Fig. 13. The latter is then passed on between the finishing-rolls L″ L‴ and discharged by sliding over table M‴.

What I claim is—

1. In a paper-bag machine, the combination, with the table proper, of the horizontal grooved section E, which forms a continuation thereof, and is grooved and pivoted, as shown, and a bar fixed above said section and provided with ribs, all as shown and described.

2. In a paper-bag machine, the combination, substantially as shown and described, of the vertically-adjustable stud with the tilting table section, to which it is attached, the cross-bar located above the tilting section, and the vibrating lever, for the purpose specified.

3. In a paper-bag machine, the pasting and feeding wheels, and the horizontally-pivoted section, the cutter, and the vibrating lever which operates said parts, in combination with the slotted table and fixed bar, as shown and described, whereby the said section and cutter go down and remain inactive while the wheels operate, and the latter go down and remain inactive while the section and cutter rise to arrest, crease, clamp, and cut the paper, as specified.

4. In a paper-bag machine, the combination, substantially as shown and described, with the fixed bar or knife, of the cutter and vibrating lever, to which it is hinged, the spring attached to the shank of the cutter, and its free end bearing upon said lever, whereby the cutter is pressed against the fixed bar in any portion of its movement.

5. In a paper-bag machine, the vibrating pasters E′, consisting of arms having cups or disks attached to their ends, and the rod or shaft G′, having a bent arm, by which it is rocked, and the paste-trough F′, in which the pasters are arranged to rise and fall, as and for the purpose specified.

6. In a paper-bag machine, the combination of the tongue or device for opening the end of the tube, the side-folders, and the spring-flap, hinged to one of the latter, as shown and described.

7. In a paper-bag machine, the combination, substantially as shown and described, of the catch-plates, arranged to slide over the folded end of the tube and draw the latter backward, and the flap for turning up and pressing upon

the lower corner of the tube-bottom, and thereby completing the formation of the bag.

8. In a paper-bag machine, the combination of the catch-plates and the hinged spring-flap of the plate for pressing upon the lower corner of the tube-bottom as the tube passes beneath it, as specified.

9. In a paper-bag machine, the combination of the cam R′, rack-bar P′, pinion O′, angular arm N′, tongue L′, and a spring encircling the rod M′, to which the tongue is attached, as shown and described.

10. In a paper-bag machine, the combination of the connecting-rod W′, angular arm N′, pinion O′, tongue L′, and presser-foot T′, and fingers U′, and the crank-shaft V′, to which the latter two are attached, all as shown and described.

11. In a paper-bag machine, the combination of the arms A‴, rods Z′, tappet *s*, lug *t*, folding-flap G″, spring on the shaft of the latter, tappet-arm D‴, and cam-wheel K′, as shown and described.

OTIS EVERETT DAVIDSON.

Witnesses:
R. F. KEESEE,
H. C. CURRY.