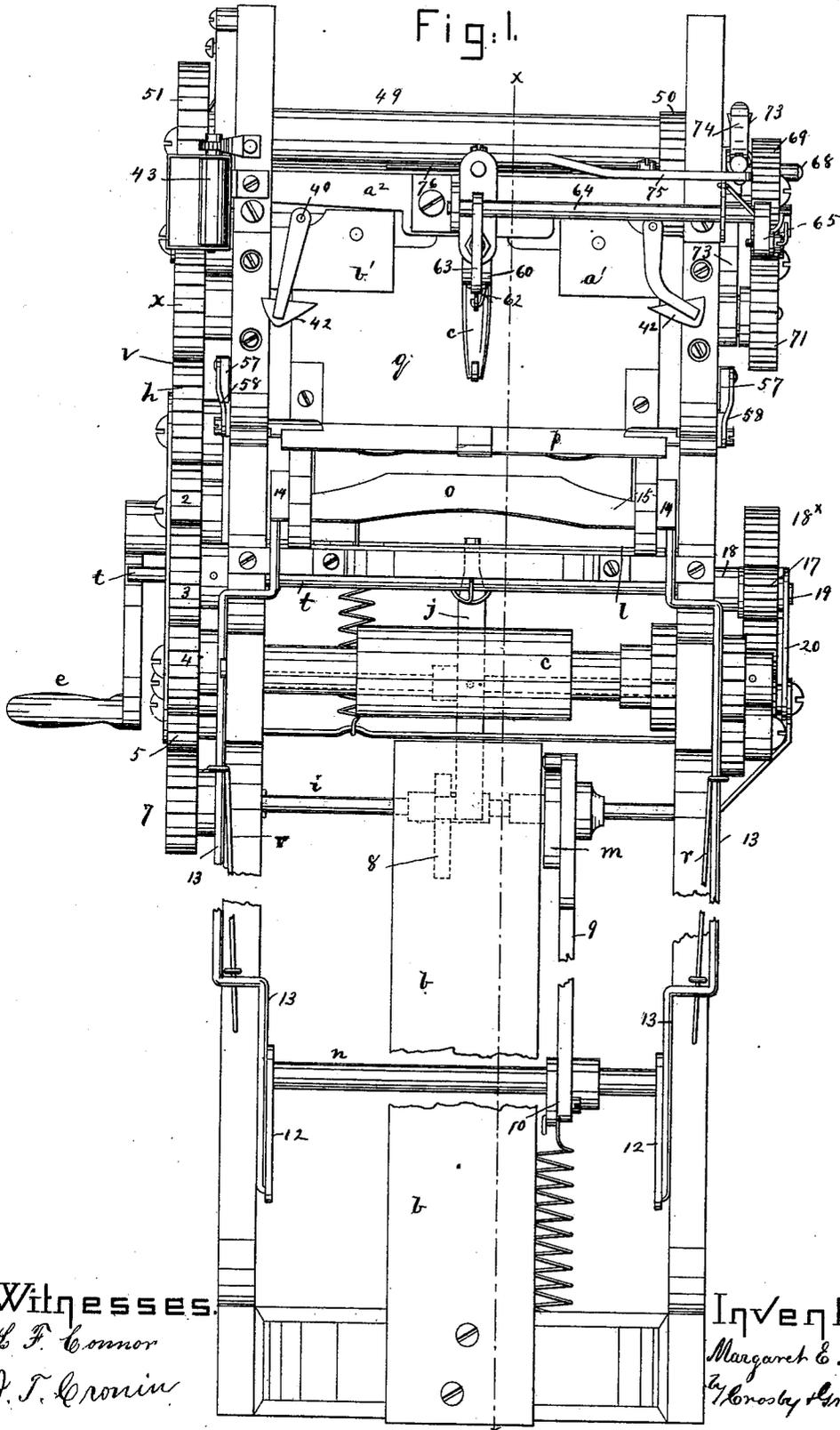


M. E. KNIGHT.  
Paper-Bag Machine.  
No. 220,925. Patented Oct. 28, 1879.

Fig. 1.



Witnesses  
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J. T. Cronin

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By Hensley Gregory  
Attys

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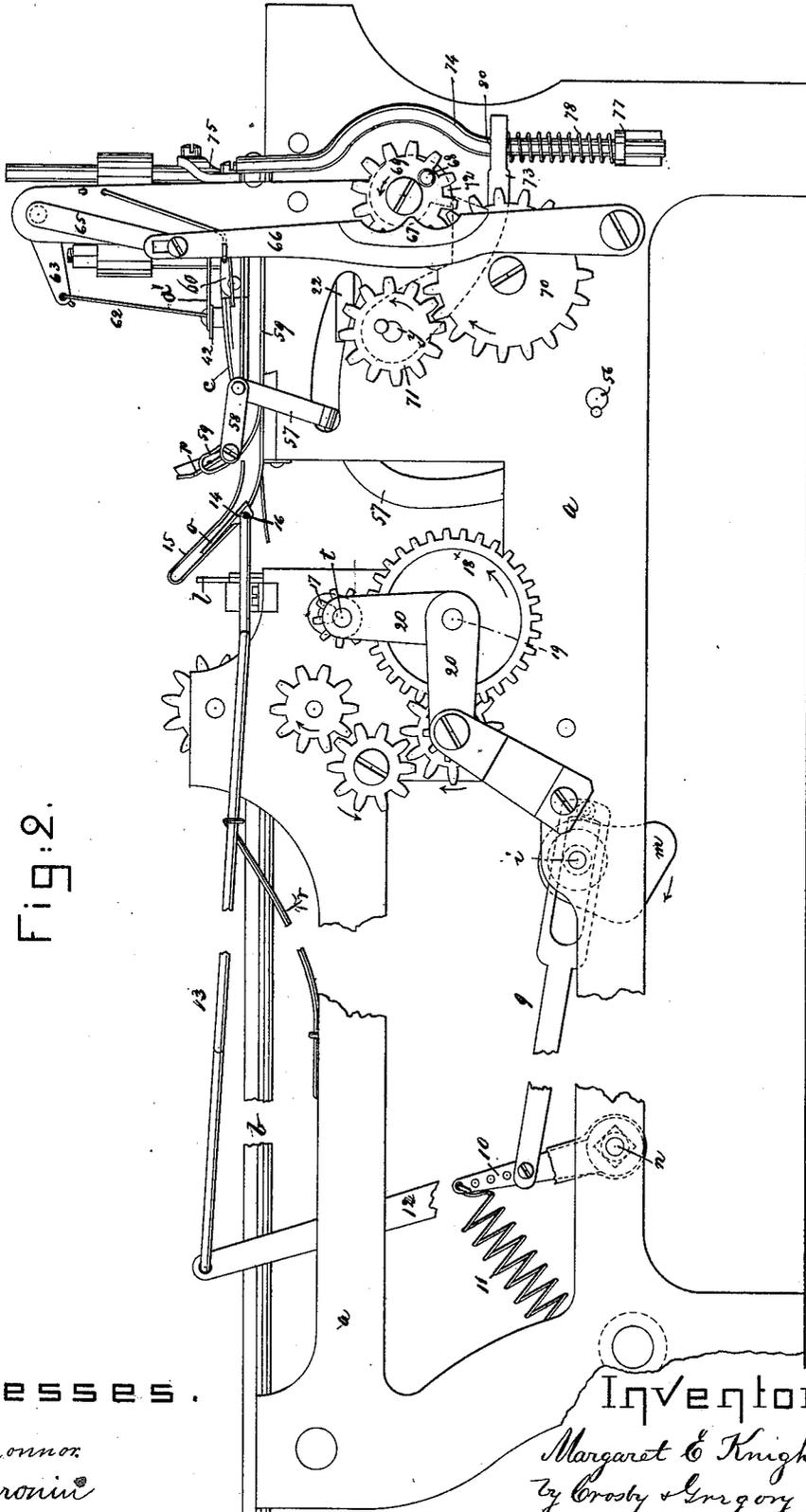


Fig:2.

Witnesses.

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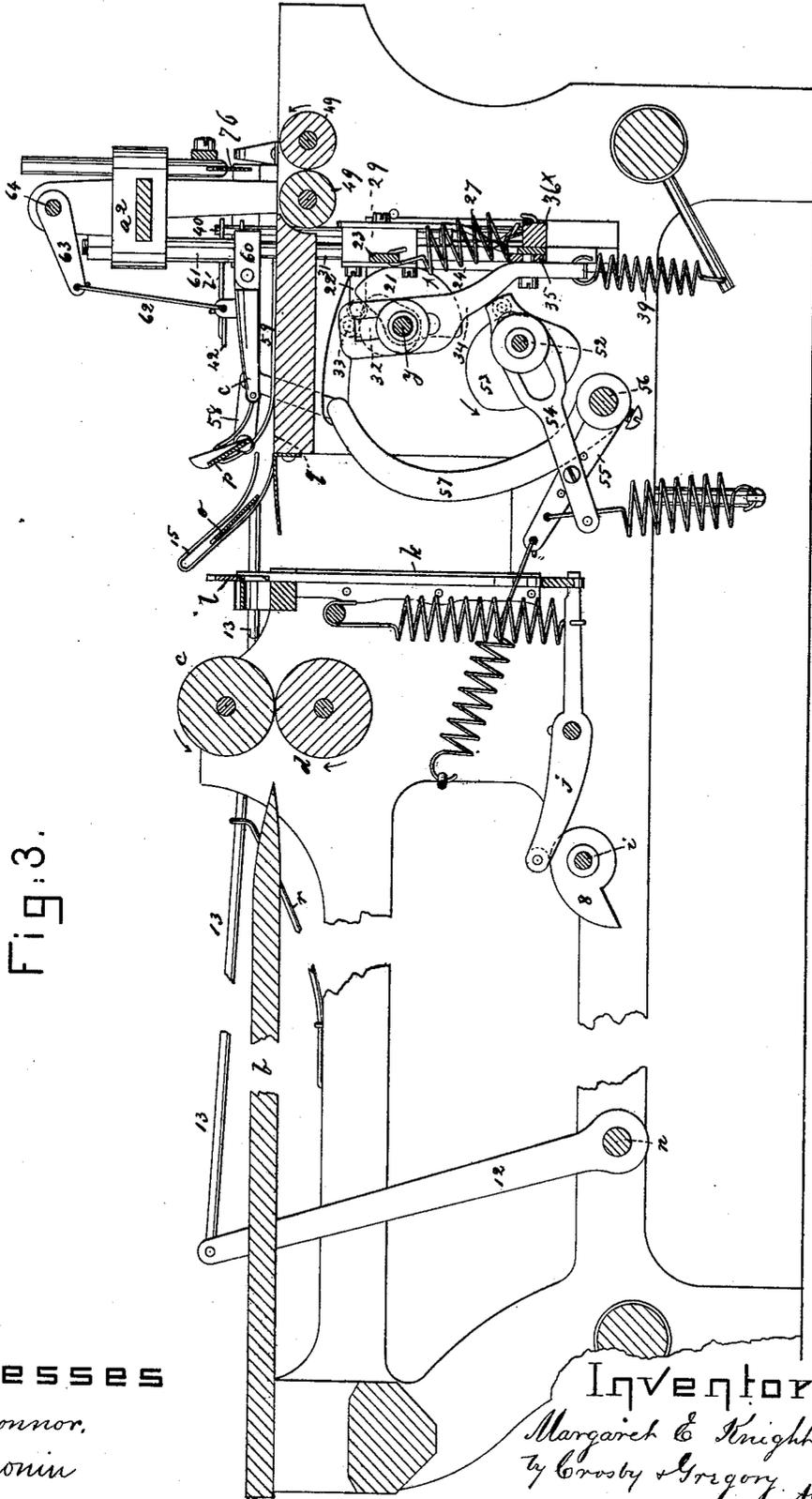


Fig. 3.

Witnesses

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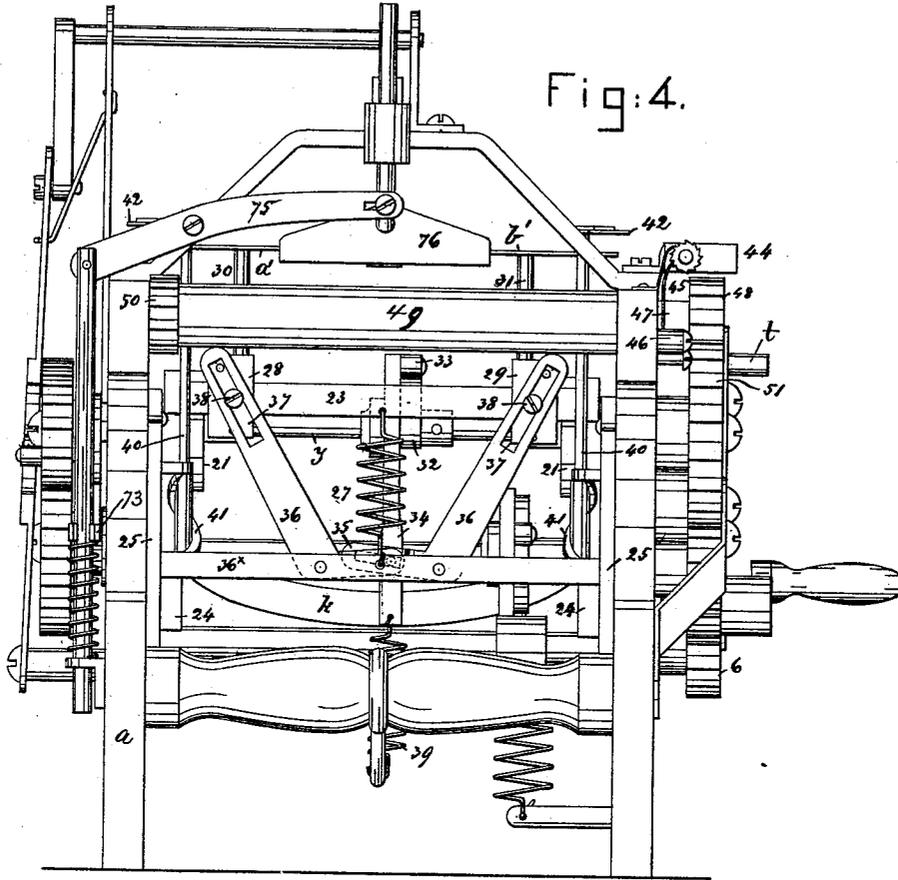


Fig:4.

Fig:13.

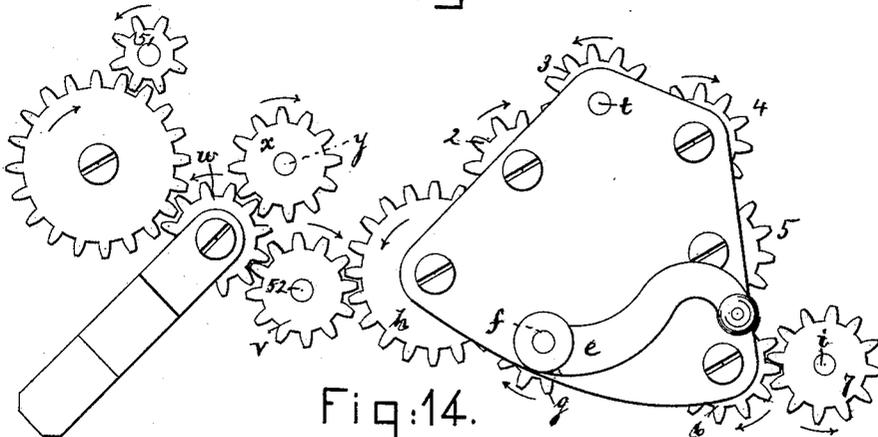
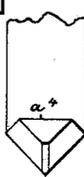
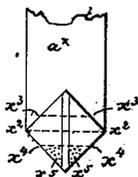


Fig:14.

Witnesses.

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Fig:9.

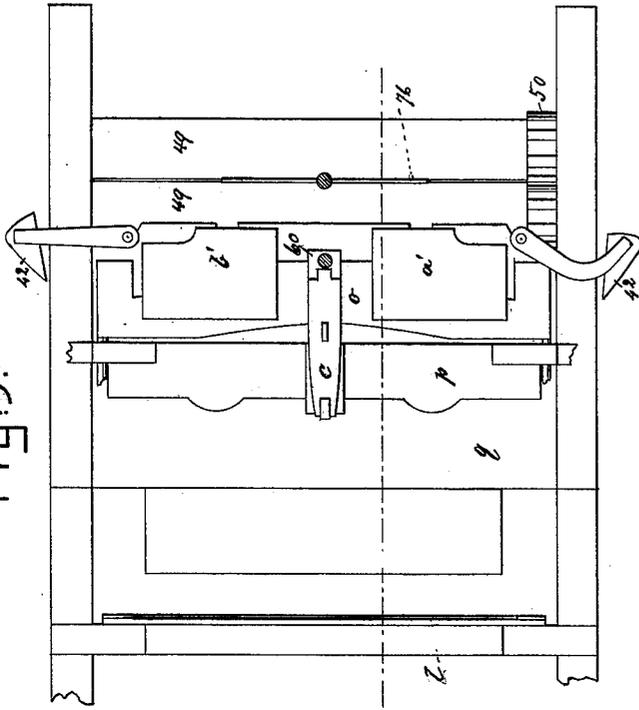


Fig:10.

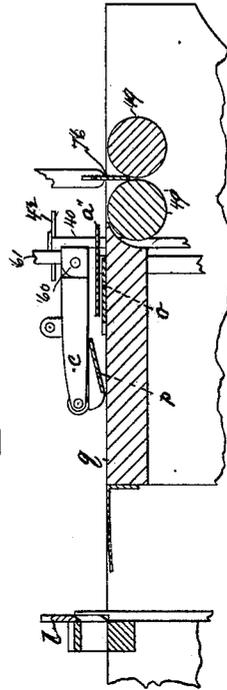


Fig:5.

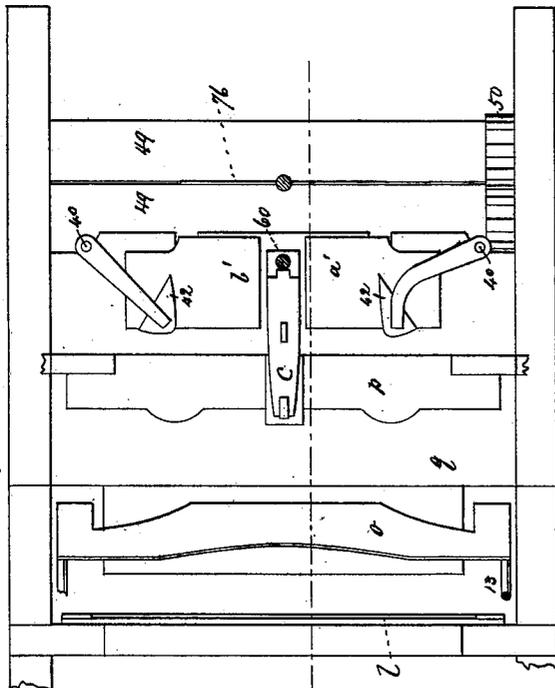
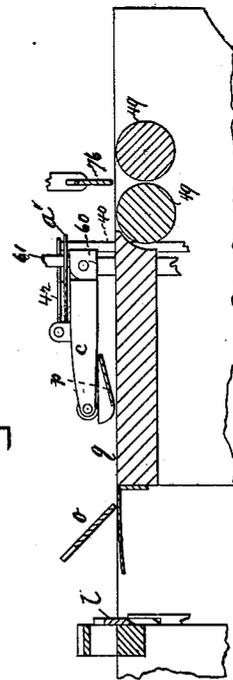


Fig:6.



Witnesses.

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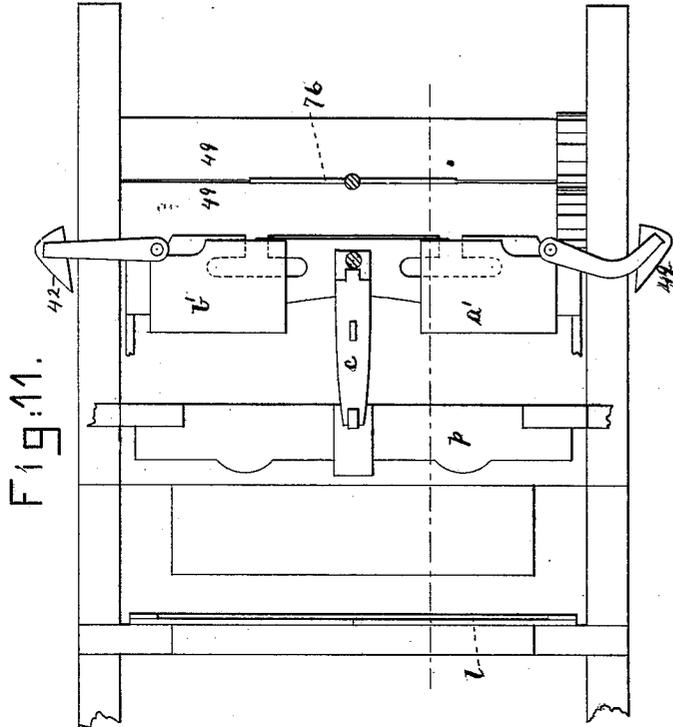


Fig:11.

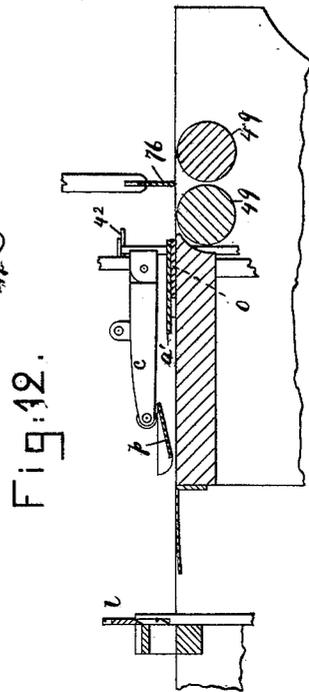


Fig:12.

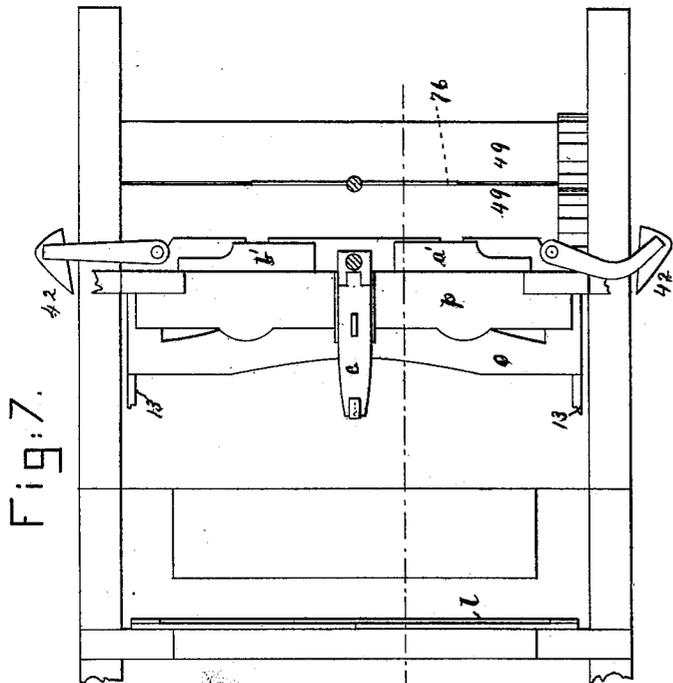


Fig:7.

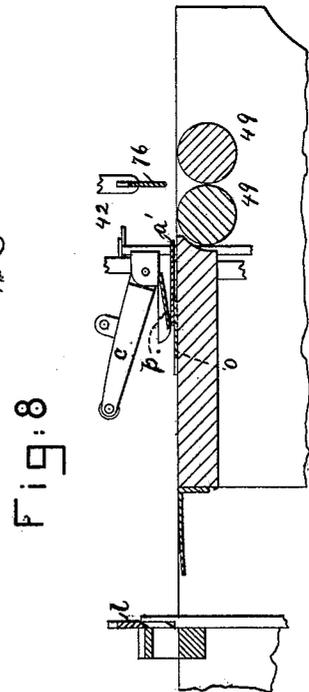


Fig:8

Witnesses.

L. F. Connor  
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# UNITED STATES PATENT OFFICE.

MARGARET E. KNIGHT, OF SPRINGFIELD, MASSACHUSETTS, ASSIGNOR TO  
THE EASTERN PAPER BAG COMPANY.

## IMPROVEMENT IN PAPER-BAG MACHINES.

Specification forming part of Letters Patent No. **220,925**, dated October 28, 1879; application filed July 10, 1879.

*To all whom it may concern:*

Be it known that I, MARGARET E. KNIGHT, of Springfield, county of Hampden, State of Massachusetts, have invented an Improvement in Paper-Bag Machines, of which the following description, in connection with the accompanying drawings, is a specification.

This invention relates to machines for making paper bags of the satchel-bottom class, and is an improvement on the machine represented in United States Patent No. 116,842, granted to me July 11, 1871, to which reference may be had.

The paper from a reel is formed into a tube and pasted together before being folded for the bottom of the bag.

This my present invention relates, chiefly, to the main folding-blade and an auxiliary feeding-blade having certain time and order of motion relatively to the finger and side-folders, as hereinafter described, whereby the bottom of the bag is completed, except as to its last fold, in an easy and rapid manner, without tearing or straining it out of shape; also, to the combination, with the side-folders, of pasting mechanism to apply paste to the said side-folders, they applying paste to one of the overlapping corners of the bag-bottom.

Figure 1 represents, in top view, enough of a paper-bag machine to illustrate my present invention; Fig. 2, a side elevation thereof; Fig. 3, a longitudinal vertical section on the line *x x*, Fig. 1; Fig. 4, a view of the delivering end of the machine; and Figs. 5, 6, 7, 8, 9, 10, 11, and 12 are detail plan or top views and longitudinal sections of the various blades, folders, and finger constituting the bottom-forming devices in the several different positions they will occupy when forming the bottom of the bag, as will be hereinafter fully described. Fig. 13 is a detail of the gearing herein employed at the left-hand side of the machine; and Fig. 14, a detail showing the first or diamond fold, the second or cross fold, and the third or finishing fold.

The frame *a* is of suitable shape to sustain the working parts.

The former *b*, about which the tube of paper is to be formed, will be provided with a follower, such as described in my said patent, or

such as described in United States Patent No. 215,578, it serving to keep the end of the tube open, the end of the follower co-operating with the finger, all as described in either of the said patents, and need not therefore be herein further described.

The tube-feeding rollers *c d* are arranged to bear upon the under and upper sides of the pasted tube to move it forward over the former *b* and upon the end of the finger *e*, and are driven intermittingly to permit the tube to rest at the proper times during the folding of the bottom of the bag and while severing the tube into bag-lengths, all as usual. These rollers will be grooved annularly for the passage of the follower, all as usual.

In this present embodiment of my invention power to drive the machine is applied to the handle *e* on a shaft or stud, *f*, having a pinion, *g*, which engages and rotates a toothed gear, *h*, that through a train of gear, 2 3 4 5 6 7, turns the shaft *i*, which has upon it the cam 8, that moves the lever *j* and reciprocates the frame *k*, which carries the tube-severing blade or knife *l*, which may be made to operate as described in either of the two patents referred to, no claim being herein made to any part of the said tube-severing mechanism. This same shaft *i* has a cam, *m*, that moves a link, 9, adjustably connected with an arm, 10, of a rock-shaft, *n*, operated in one direction by a spring, 11, and having arms 12, with which are connected links or rods 13, which are at their other ends jointed to the end pieces, 14, of the auxiliary feeding-blade *o*, the end pieces being fitted to move in curved guideways 15, open at their lower ends, the connection of the rods or links 13 with the said pieces 14 being by a pivot or pin, as at 16, substantially in the line of the acting front edge of the said blade *o*, so that as the forward edge of the blade *o* strikes the paper tube, and the blade passes out from the guideways 15, the said blade will tip and lie flat upon the paper, so as to readily pass under the main folding-blade *p* and beyond it, as will be hereinafter described, the blade *o* being held down upon the bed *q* by the springs *r* acting upon the rods 13.

The gear 3 is secured upon the shaft *t*, ex-

tended across the machine, and the opposite end of the shaft made as a crank, 18, and is provided with a pinion, 17, that engages an intermediate, 18<sup>x</sup>, having its shaft 19 supported by links 20, the said intermediate driving the feed-rollers intermittingly through the system of gearing shown in Fig. 2, all of usual construction, and not claimed.

The toothed gear *h*, through a train of gear, *v w x*, operates the cam-shaft *y*, having upon it cams 21, which strike rollers on arms 22, extended backward from a cross-head, 23, (see Figs. 3, 4,) having other arms 24, fitted in vertical guideways 25, attached to frame *a*, the said arms having notched plates, for a purpose hereinafter described.

The cams 21 lift the cross-head, and a spring, 27, depresses it. This cross-head 23 has placed loosely upon it sliding heads 28 29, provided with posts 30 31, to the upper ends of which are secured the side folders or pressers *a' b'*. This shaft *y* has a cam, 32, which acts upon a roller, 33, of a link, 34, connected with the short arms 35 of two levers, 36, pivoted on bar 36<sup>x</sup>, and provided with long slots 37, which receive pins or projections 38 of the sliding heads 28 29, the vibration of the levers 36 acting to move the sliding heads on the cross-head, and consequently also moving the side folders or pressers toward and from each other in unison, the vertical motion of the cross-head raising and lowering the side folders or pressers at the proper times, as will be hereinafter described.

The link 34 is drawn down by the spring 39.

The rods 40, supported by bar 36<sup>x</sup>, have at their lower ends helical fins 41, (see Figs. 3, 4,) which are embraced by the notched portions of the arms 24 of the cross-head, and as the latter is raised and lowered the rods 40 have imparted to them a rotary reciprocating motion sufficient to move the side-pasters 42 from the paste-rollers 43 (there, in practice, being one paste-roller and paste-box, 44, at each side of the machine) to a position in contact with the top surface of the side-folders *a' b'*, and apply paste to said folders, so that the first corner-fold laid over upon the said side-folders by the second forward movement of the main folder *p* will be pasted at its under side, the side-folders being withdrawn from below said folded or overlapping portion laterally.

The paste-roller 43 is rotated intermittingly by a pawl, 45, at the end of a spring-arm, 46, actuated in one direction by a lug, 47, at the rear of pinion 48, on one of the bag-delivering rollers 49, they being geared together by pinions 50, so as to turn at the same rate of speed at which the first roller of the pair is rotated by the action of the toothed gear 51, which derives its motion from the pinion *c*. The pinion *r* is secured at one end of a shaft, 52, provided with a cam, 53, which, by a link, 54, is adjustably connected with an arm, 55, of a rock-shaft, 56, having at each end arms 57, connected by links 58 with each end of the

main folding-blade *p*, so that the said blade may turn freely to move in the curved guideways 59, the said blade rising at times entirely above the paper upon the bed, and at times moving backward and forward longitudinally under the finger *c* and over the side folding blades or pressers.

The finger *c*, pivoted to the foot or holder 60 at the lower end of a vertically-adjustable rod, 61, held by the arch *a*<sup>2</sup>, is connected by link 62 with an arm, 63, of a rock-shaft, 64, having at its other end an arm, 65, connected with the upper end of lever 66, having a cam face or edge, 67, acted upon by a roller-stud, 68, on a gear, 69, driven by gearing 70 71, the latter gearing being at one end of shaft *y*. At the rear side of this gear 69 is a shouldered cam or tappet, 72, (shown in dotted lines, Fig. 2,) it acting upon a toe or lug of an arm, 73, forked at its outer end to embrace a guided rod, 74, connected at its upper end with the lever 75, that lifts the final-folding blade 76, which acts upon the paper after the diamond fold has been formed, and forms the final fold for the bag-bottom, passing the paper into the bite of the delivering-rollers 49, between which the completed bag is delivered from the machine.

The rod 74 is guided at its lower end by a guide, 77, which also supports a spiral spring, 78, that surrounds rod 74, and bears the arm 73 up against the tappet 72, the arm 73 resting against a shoulder, 80, of the said rod. As the arm 73 compresses the spring 78 the rod 74 is drawn down; but as the shoulder of the tappet 72 passes a projection on arm 73 the spring throws it up and quickly depresses the final folding-blade, 76.

The cams 53 *m* and 21 32 will be of such shape and so timed, the one with relation to the other, as to give to the main folding-blade and auxiliary feeding-blade and side-folders the movements and rests in the time and order hereinafter described in the operation of the machine.

I desire it to be understood that I lay no claim to the special gearing and driving parts herein described, and in practice I may vary therefrom as may be found desirable to attain the most direct and positive movements with fewest parts and least friction.

Operation: Referring to Figs. 2 and 3, the main folding and auxiliary feeding blades *p o* and side-folders *a' b'* are shown lifted as they will be while the open end of the paper tube is fed upon the point of the finger *c*. When the tube has been fed upon the finger for the proper distance, the main folder *p*, operated by the cam 53 and connecting parts 54, 55, 56, 57, 58, and 59, is caused to descend upon the tube and pass under the finger, the latter then, within the open mouth of the tube, being somewhat raised by the stud 68 striking the cam part 67 of the lever 66, acting to turn back the upper ply of the tube forming the diamond fold, (represented at diagram *a*<sup>x</sup>, Fig. 14,) and then the auxiliary feeding-blade *o* (a device not used in my former patent) descends upon

the paper tube, which has been severed into a bag-length. In this condition the blades are as in Figs. 5, 6, wherein it will also be noticed that the side-folders have been moved inward from their outermost positions. (Shown in Fig. 11.) Now, the auxiliary blade *o*, in moving forward, it being actuated by the links 13, arms 12, link 9, and cam *m* on shaft *i*, turns down substantially parallel with the bed *g*, and travels along above and in contact with the paper, passing under the main blade *p* and finger *c*, striking the paper at the fold represented by the line  $x^2 x^2$ , Fig. 14, carrying the said folded part of the paper forward away from the front edge of blade *p*, and under the side folders or pressers *a' b'* for a distance equal to the distance between the folded part  $x^2$  and the line of fold  $x^3$ , Fig. 14, the side-pressers being yet elevated by the cams 21, after which the cams 21 are rotated, permitting a spring, 27, to throw down the side-folders to clamp the paper, while the main folding-blade is, by the cam 53, arms 57, and connections with the said blade, again moved forward partially over the lowered side-folders, thereby forming the first end fold on the dotted lines  $x^3 x^3$ , or as at  $a^4$ , Fig. 14, the blades and folders then being as in Figs. 7, 8.

The side-folders, when elevated, were supplied with paste by the side-pasters 42, so that the under side of the paper, folded over thereon by the blade *p*, becomes pasted.

The folding-blade *p*, having reached the position shown in Figs. 7, 8, now starts back, and as it is being so moved back the side-pressers are also moved outward, the blade *p*, in its backward movement, resting, or substantially so, as it passes from above the side-pressers, the side-pressers in their retreat resting, or substantially so, after they pass out from under the end fold  $a^4$ . In this condition auxiliary feeding-blade *o* again starts forward, striking the under side of the diamond fold at the line  $x^2 x^2$ , carrying the folded paper along under the side-folders, which are lifted a short distance, and as the blade reaches the position shown in Figs. 9, 10 the final folder, 76, held up by the arm 73, acted upon by the tappet 72, is permitted to descend by the action of the spring 78 on the rod 74, causing the blade 76 to strike the leading end of the diamond fold, forcing it into the bite of the rollers 49, forming the crease or fold represented by dotted lines  $x^4 x^4$ , forming the fold  $a^5$ , after which the side-pressers are raised a little, and the blade *o* continues its forward movement to assist in feeding the bag. The side-folders then complete their outward movement through the action of cams 32, levers 36, and sliding heads 28 29, the said side-pressers being at the same time elevated through the operation of cams 21, the main folding-blade *p* during this rising and outward motion of the side-pressers being again started back, leaving the blades as in Figs. 11, 12, wherein the positions of the parts are shown when the blade *o* is farthest forward, and from the position shown

in Figs. 10, 11 the blades and folders move back to their starting-points, as in Figs. 1 and 3. Just after the final folder, 76, strikes the paper, the side-folders commence to rise and move outward, as before described.

During the latter portion of the forward movement of blade *o* in contact with the paper on the line  $x^2 x^2$ , it acts as a feed for the tubular severed bag-lengths. The pasters 42 and side-folders leave paste at the points  $x^5$  of the bag. (See Fig. 14.)

In my former patent the plate knife folder, after passing under the finger and side-folders, was retracted and again moved forward above the side-folders to complete the first corner-fold of the bag-bottom.

By employing the auxiliary feeding-blade to co-operate with the main blade and side folders or pressers, as described, I am enabled to run the machine more rapidly with less waste of paper, and feeding the partially-folded bag by the blade *o* adds greatly to the certainty of the action of the machine.

Referring to Fig. 14, it will be noticed that the edges of the paper at the central part of the diamond fold are parallel.

It is necessary to keep the bottom square to keep these edges of the diamond fold parallel, or substantially so, and as the finger runs out of the diamond fold and leaves these edges separated, the holding part 60 at the rear of the joint of the finger acts to keep these edges in proper place and not permit them to approach each other nearer at one end of the diamond fold than at the other, which would destroy the uniformity of the bag-bottom.

I claim—

1. In a paper-bag machine, the main folding-blade and finger to enter and fold back the tube end, combined with the auxiliary feeding-blade, adapted to carry the folded paper beyond the front edge of the main folding-blade, substantially as described.

2. The combination, in a paper-bag machine, of the finger to enter and turn back the open end of the tube, the main folding-blade to co-operate with the finger and form the diamond fold, the auxiliary feeding-blade to carry the partially-folded bag-bottom beyond the main folding-blade, the side folders or pressers to descend upon and hold the paper in position while the main folding-blade passes partially over the side folders or pressers to operate upon and fold the tube to complete a satchel-bottom, except as to its final fold, substantially as described.

3. The combination, in a paper-bag machine, of the finger to enter and turn back the open end of the tube, the main folding-blade to co-operate with the finger and form the diamond fold, the auxiliary feeding-blade to carry the partially-folded bag-bottom beyond the main folding-blade, the side folders or pressers to descend upon and hold the paper in position while the main folding-blade passes partially over the said side folders or pressers to operate upon and fold the tube to complete a

satchel-bottom, except as to its final fold, and the final-folding blade and delivering-rollers, to operate substantially as described.

4. The side folder or presser *a'* and paste-box 44, combined with the vibrating paster 42, and mechanism, substantially as described, whereby the said paster is made to convey paste from the paste-box and apply it upon the face of the side folder or presser, substantially as described.

5. In a paper-bag machine, the combination, with the side folders or pressers, of pasting

mechanism, substantially as described, to apply paste thereon, to be subsequently transferred to the end fold *a'* of the paper when laid over upon the upper faces of the side folders or pressers, substantially as described.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

MARGARET E. KNIGHT.

Witnesses:

HENRY A. CHAPIN,  
E. G. MACFARLAND.