2 Sheets--Sheet 1.

W. DANIELS.

Folding and Perforating Machine.

No. 167,309. Patented Aug. 31, 1875.

Fig. 1.

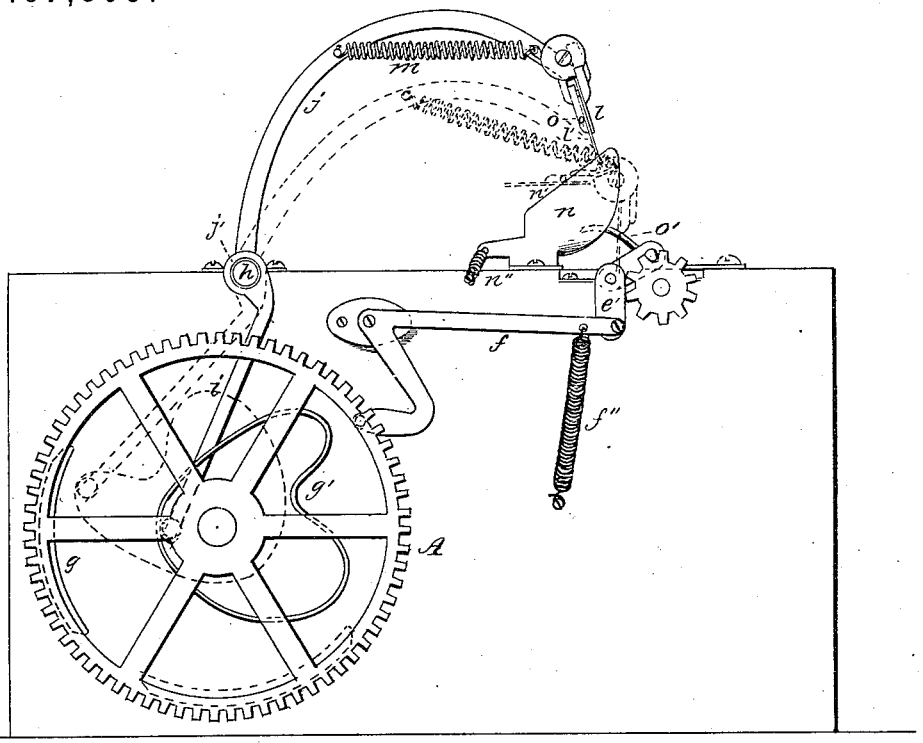

Fig. 2.

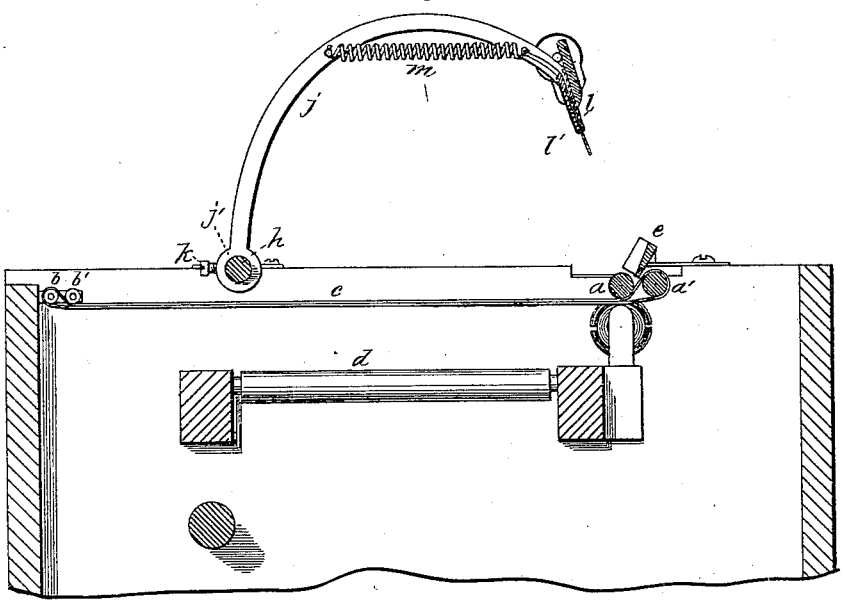

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Fig. 3.

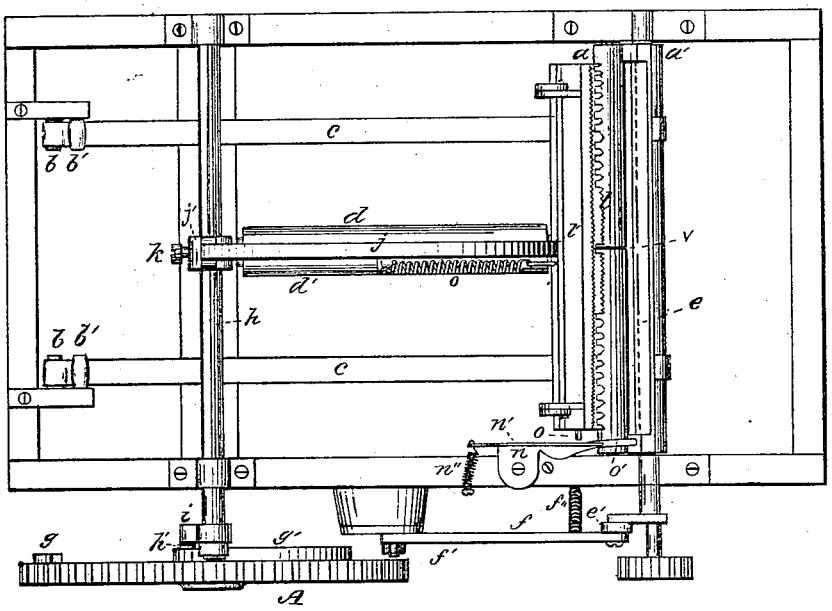


Fig. 4.

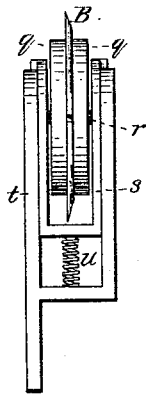


Fig. 5.

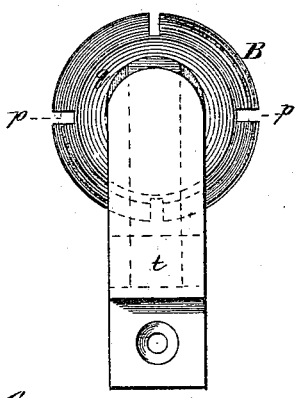
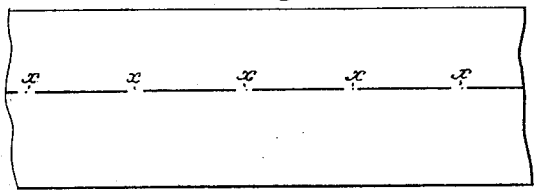


Fig. 6.



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UNITED STATES PATENT OFFICE.

WILLIAM DANIELS, OF BROOKLYN, NEW YORK.

IMPROVEMENT IN FOLDING AND PERFORATING MACHINES.

Specification forming part of Letters Patent No. **167,309**, dated August 31, 1875; application filed August 12, 1875.

To all whom it may concern:

Be it known that I, WILLIAM DANIELS, of Brooklyn, in the county of Kings and State of New York, have invented a new and valuable Improvement in Combined Folding and Perforating Machines; and I do hereby declare that the following is a full, clear, and exact description of the construction and operation of the same, reference being had to the annexed drawings, making a part of this specification, and to the letters and figures of reference marked thereon.

Figure 1 of the drawing is a representation of a side elevation of my invention. Fig. 2 is a vertical longitudinal section. Fig. 3 is a plan view. Figs. 4 and 5 are detached views, on an enlarged scale, of the rotary perforator and its attachments. Fig. 6 is a view of the paper after being perforated.

This invention has relation to paper folding and perforating machines; and consists, principally, in combining a folding-machine with a rotary perforator, so that by its use a filament is left in the paper at suitable distances between the line of incisions, in order to retain the sheets in position in the subsequent folding and handling; also, to facilitate the separation of the leaves by running the finger or any small article along the fold.

My invention also consists in two disks or plates of metal, wood, or other comparatively non-elastic material, the peripheries of such disks kept in contact with the surface of one of the folding-rollers by supporting the perforator and disks in a carriage arranged to slide vertically and automatically within a frame.

My invention further consists in pivoting the horizontal perforating-knife to the folding-blade, and the employment of suitable mechanism for operating it, as will be hereinafter described.

In the drawings, *a a'* represent the first pair of folding-rollers, and *b b'* the band-rollers, around which the conveying-bands *c* travel; and *d d'* represent the second pair of folding-rollers arranged below such conveying-bands. Above the rollers *a a'* is a slotted plate, *e*, having its journals in bearings in the frame of the machine; motion being given to the plate by a cam, *g*, upon a main driving gear-wheel, A, acting upon a friction-roller, *f'*, secured to the end of a curved arm, *f*, the arm also being connected to the end of the slotted plate by a link, *e'*. A spring, *f''*, acts to force the plate *e* back to its proper position after being operated upon by the cam *g*. An eccentric, *g'*, composed of a flat metal band secured to the inner side of the wheel A, conveys motion to the shaft *h* through the medium of the crank-arm *i* secured thereto, and which has upon its lower end a friction-roller, *h'*. The several folding-rollers are provided with the usual arrangement of gearing connecting with the main driving-wheel A, by which motion is imparted to the several parts of the machine. A curved arm, *j*, is formed with an eye, *j'*, through which the shaft *h* passes, and is secured thereon by a set-screw, *k*. To the end of the arm *j* is a horizontal folding-blade, *l*, having pivoted a swinging perforating-knife, *l'*, formed with lancet-points extending below the edge of the folding-blade *l*, and kept in position against the face of the same by a spring, *m*. The knife *l'*, pivoted to the folding-blade, with the mechanism for operating them, which will be hereinafter described, entirely dispenses with an additional curved arm, and an arrangement of devices to operate it, greatly simplifying the construction, and thereby reducing the cost of manufacture, as well as giving the operator more time in which to adjust and arrange the sheets during the operation of the machine. A pivoted plate, *n*, formed with an inclined edge, *n'*, and a curved inner face, in connection with pin *o* and horn *o'* upon the perforating-knife *l'*, and slotted plate *e*, assists in completing the operation of the same, which will be explained hereafter.

The rotary perforator, as shown at B, has a plain cutting surface or edge, and formed with incisions, *p*, at suitable intervals, and of sufficient depth to extend below the cutting surface or edge of the perforator, for the purpose of leaving a filament in the paper, as illustrated at *x*, Fig. 6, at suitable distances between the line of incisions, in order to retain the sheets in position in the subsequent folding and handling; also, to facilitate the opening of the leaves by simply running the finger along the fold, thus opening the periodical

for perusal without the employment of a knife or paper-cutter, which are not at all times conveniently at hand.

The rotary perforator B is held between two annular disks or plates, *q q*, of metal, wood, or other comparatively non-elastic material. These disks are secured to the face of the perforator B by screws or other suitable means, so that they will revolve with the perforator upon the shaft *r*, secured to the sides of a carriage, *s*, arranged to slide vertically and automatically in guides formed in the sides of a frame, *t*. A spring, *u*, is interposed between the carriage and frame, for the purpose of keeping said carriage pressed upward, bringing the disks *q* against the folding-roller *a*, and the cutting-edge of the rotary perforator B in position in the groove *v* of said roller. By this arrangement of supporting the rotary perforator in a manner that will admit of its automatic vertical adjustment, I am enabled to use hard or comparatively non-elastic material for the clamping disks or plates *q*, presenting at all times to the periphery of the folding-roller a perfectly uniform bearing-surface, which could not be obtained with a flexible or elastic material, such as rubber, thereby perforating the paper perfectly true in the line of the fold.

The operation of the machine will be understood from the following description: The slotted plate *e* being in position, as illustrated in Fig. 2, and the sheet of paper placed in position under the perforating-knife *l'*, motion is imparted to the gear-wheel A, the eccentric *g'* thereon relieving the crank-arm *i*, and allowing the curved arm *j* upon the shaft *h* to descend, carrying with it the perforating-knife *l* and folding-blade *l'*. The cutting-points of the knife extend below the edge of the folding-blade to insure its operation upon the paper. As the cam *g* is brought around in contact with the friction-roller *f''* it forces the arm *f* upward, which brings the slotted plate *e* in a horizontal position under the perforating-knife *l'*, the horn *o'* bearing against the curved position upon the inner side of the pivoted plate *n*, and throwing it outward from contact with the pin *o* upon the perforating-knife, allowing the same to descend in the line of the fold; the knife being sufficiently weighted to cause it to pass through the sheet that is supported upon the slotted plate *e*, after which the knife is partially raised by the eccentric *g'* acting upon the crank-arm *i*, while the cam *g* passes the roller *f'*, and allows the spring *f'''* to act upon the curved arm *f*, which brings the slotted plate to its original position, to admit of the perforated sheet being carried in between the rollers *a a'*. The pressure of the horn *o'* upon the plate *n* is now removed, the spring *n''* bringing the plate in position in a line under the pin *o*; so that upon the descent of the curved arm *i* the pin *o* is brought down upon the inclined edge *n'* of the plate *n*, causing the perforating-knife *l'* to be thrown out of the way of the folding-blade, to allow the same to descend and carry the perforated sheet between the rollers *a a'*, where it is again acted upon by the rotary perforator B, to perforate the sheet upon the line of the second fold, after which it is carried between the second pair of rollers *d d'* by the folding-blades ordinarily used in folding-machines.

Having now fully described the construction and operation of my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The combination, with a paper-folding mechanism, substantially as described, of a rotary perforator, whereby the sheets are folded and perforated on the line of the next fold, for the purpose set forth.

2. In a paper-folding machine, the combination of the rotary perforator B, clamping disks or plates *q*, and carriage *s*, arranged to slide automatically and vertically within a frame, *t*, substantially as and for the purpose specified.

3. The combination of the arm *f*, folding-blade *l*, and pivoted perforating-knife *l'*, constructed to operate substantially as and for the purpose set forth.

In testimony that I claim the above I have hereunto subscribed my name in the presence of two witnesses.

WILLIAM DANIELS.

Witnesses:
NAT. E. OLIPHANT,
E. I. OLIPHANT.