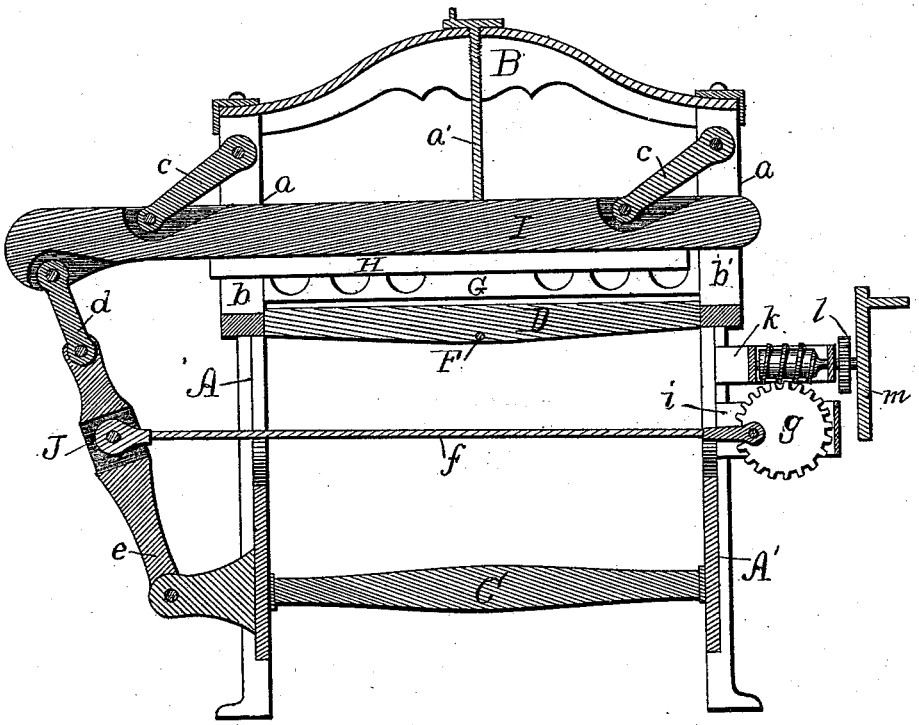
A. BECK.

Paper-Cutting Machine.

No. 213,089. Patented Mar. 11, 1879.

Fig. 1.



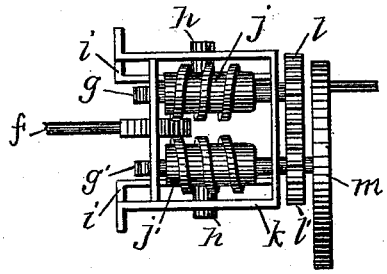


Fig. 2.

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ADAM BECK, OF NEWTON LOWER FALLS, MASSACHUSETTS.

IMPROVEMENT IN PAPER-CUTTING MACHINES.

Specification forming part of Letters Patent No. **213,089**, dated March 11, 1879; application filed January 18, 1879.

To all whom it may concern:

Be it known that I, ADAM BECK, of the town of Newton Lower Falls, county of Middlesex, and State of Massachusetts, have invented certain new and useful Improvements in Paper-Cutting Machines, of which the following is a specification:

This machine is designed for the use of printers, book-binders, paper and card-board manufacturers, &c., and is intended to cut or trim a large number of sheets of paper or paper-board at one operation.

In this machine the knife, which rises and falls in an oblique direction with respect to the bed is suspended at each end by swinging arms, which are pivoted at their upper extremities to the overarching frame of the machine, the movements of the knife upon its suspensories being effected by a toggle-jointed lever, one end of which is pivoted to the knife-stock, and the other to the lower part of one of the standards of the machine-frame, while the lever, in its turn, is actuated by a rod, which is pivoted at one end to such lever, and at its opposite end is pivoted to and between two twin worm-gears mounted upon a longitudinal shaft, which is supported by a bracket from the opposite standard of the machine-frame, while the gears, in turn, engage and are driven by twin worms mounted upon shafts, also supported by the said bracket, and disposed above the gears at right angles to the gear-carrying shaft, the outer journals of the worm-shafts being connected by twin spur-gears, which engage each other, and the whole being so organized and operating that the revolution of one worm, by the agency of a crank affixed to its shaft, effects continuous rotary movements in one direction of the opposite worm and of the worm-gears, while each revolution of these gears effects a reciprocating movement of the lever-rod, and a straightening and contraction of the toggle-lever, and consequently a rise and fall of the knife in an oblique direction, or with a "shear" or "drawing" cut, as it is usually termed.

The drawings which accompany this specification and illustrate my invention represent, in Figure 1, a sectional elevation of the machine, and Fig. 2 a plan of the motive power.

In these drawings, the general frame of the machine is represented as composed of side standards, A A′, united at top by a beam or cross-head, B, and at bottom by ties or bars C C, &c., while about midway of the standards, and spanning the area between them, is a horizontal platen or table, D, upon the top of which is placed a sliding gage or stop, properly adjusted thereon by a feed-screw, F, arranged below the platen, and rotated by a hand-wheel disposed at the front of the latter.

A clamp or presser-bar to confine the sheets of paper to the platen while being trimmed by the knife is shown at G as disposed above and transversely of the platen, and supported within guides *a a*, created in opposite sides of the standards A A′, such presser-bar being operated in vertical planes by a feed-screw, *a′*, which is secured to it at its lower end, and is operated by hand-wheel affixed to its upper end.

The above organization of parts represents a machine now generally employed in cutting and trimming paper.

My improvement in these machines consists, as before premised, in mechanism for operating the knife; and in carrying out such improvement I proceed as follows: The knife is shown at H as secured to the lower part of a horizontal beam or stock, I, which is guided in its movements by slots or ways *b b′*, formed in the standards A A′ alongside of the guides *a a*, before named, the two pairs of guides *a a* and *b b′* being parallel and equal distances asunder, in order that the clamp-bar and knife shall also remain parallel to one another.

The knife-stock I is suspended at opposite ends from the lower ends of two swinging arms or links, *c c*, which are pivoted to the knife-stock, while the upper ends of these arms are, in turn, pivoted to the upper part of the standards A A′, or to the cross-head B, as the case may be, the arrangement of the knife-stock and its suspensories being such that the knife rises and falls in an oblique direction with respect to the platen, and so as to exert a drawing or shear cut upon the paper.

One extremity of the knife-stock I is pivoted to the upper end of a link or arm, *d*, this link constituting the upper portion of a toggle-jointed lever, J, whose lower part or arm is shown at *e* as pivoted at its lower extremity to

the lower part of the adjacent machine-standard A, while such lever is operated by a rod, *f*, which is swiveled at one end to the arm *e* in a suitable manner, and extends below the platen to the opposite side of the machine, and through a slot beneath the slot *b'*, and is there pivoted conjointly to the inner faces of two twin-shaped oppositely-disposed upright worm-gears, *g g'*, which are mounted upon a common horizontal shaft, *h*, supported at its journals in a yoke or strut, *i*, secured to the outside of the standard A', the conjoint rotation of these gears having the effect of imparting reciprocating movements to the rod *f*, and corresponding expansion and contraction of the toggle-lever, and, through the latter, oblique movements of the knife to and fro of its guide.

To provide a powerful means of rotating the gears *g g'*, I dispose above each a worm, *j* or *j'*, the journals of such worms being mounted in a bracket, *k*, affixed to the standard A', while to the outer journal of each worm I affix a spur-gear, *l* or *l'*, these gears being of equal size and capacity, and engaging each other, in order that when one worm is rotated its fellow shall also rotate.

To the outer extremity of the journal of the worm *j'*, I affix a crank or crank-wheel, *m*, by means of which the machine is put in motion. To operate this machine, the knife is raised to its highest position, the paper to be cut or trimmed is placed upon the platen below the knife and presser-bar, and against the gage or stop, and the presser-bar lowered upon it by means of the screw *a'*. The attendant now rotates the crank-wheel *m*, and, through the agency of the worms *j j'*, gears *g g'*, rod *f*, and toggle-lever J, the knife is caused to descend through the paper with a drawing or shear cut until it meets the platen, the attendant continuing to rotate the crank-wheel in the same direction until the knife has returned to its highest position, or so far above the paper as to permit the latter to be removed. The presser-bar is now raised and the paper removed.

The worm-gears constitute, in effect, a double crank to actuate the rod, while the wrist-pin of this crank, which is the pivot of rod *f*, is placed at such a distance from the axis of the shaft *h h*, and the scope of the toggle-lever is so calculated with respect to the wrist-pin, that as the knife reaches the platen the wrist-pin is at its extreme of movement in one direction. and the toggle contracted to its greatest limit; consequently a continued rotation of the crank-wheel in the same direction tends to restore the knife to its inactive position. This continuous motion of the crank-wheel in one direction is a matter of great convenience, and lessens the labor of the attendant.

In lieu of the dual arrangement of worms and worm-gears, as explained, one set may be omitted; but the strain of the rod *f* upon one gear would be one-sided, and less desirable than if two are employed.

Having thus described the nature, purposes, and operation of my machine, I claim as my invention, and desire to secure by Letters Patent of the United States, as follows:

The details of mechanism as herein described, the same consisting of the combination, with the platen and frame of the machine, of the knife, the knife-stock suspended by the arms, as stated, the toggle-jointed lever connected with the knife-stock and the machine-frame, the rod connecting the toggle-lever with the worm-gears, the worm-gears, and the worms driving such gears, the latter being connected with interlocking spur-gears, and the whole operating substantially as stated.

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Witnesses:
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