2 Sheets—Sheet 1.

E. J. FROST.

MACHINE FOR CUTTING PAPER, ENVELOPES, &c.

No. 193,327. Patented July 24, 1877.

Fig. 1.

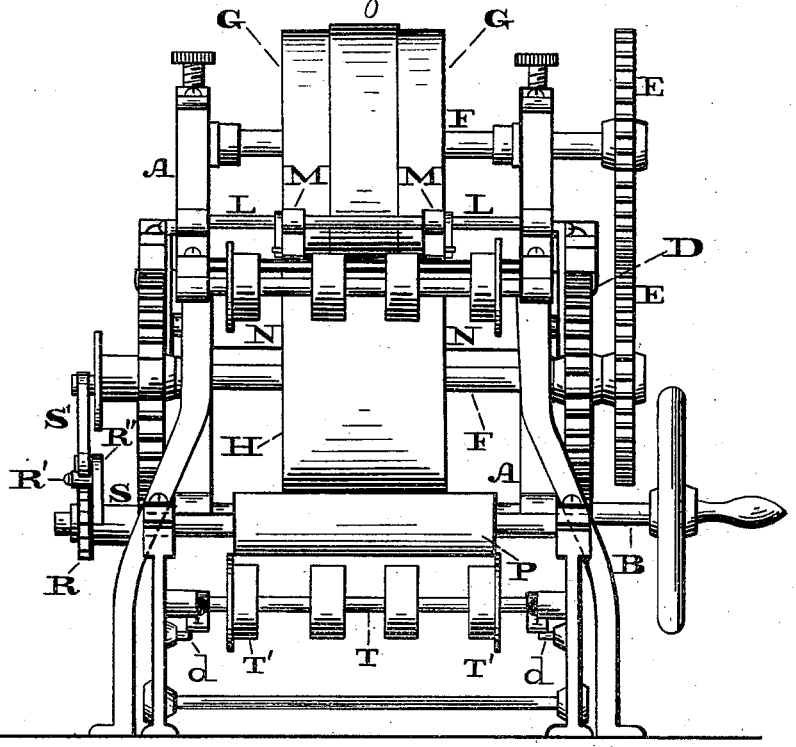
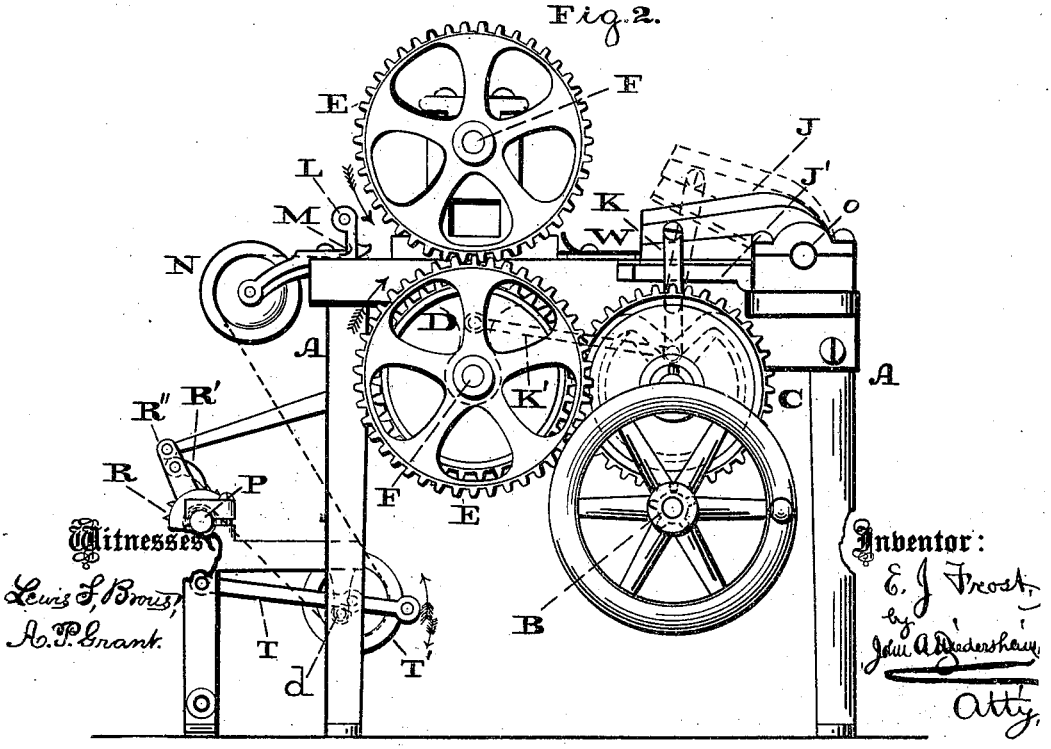


Fig. 2.



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2 Sheets—Sheet 2

E. J. FROST.

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Fig. 3.

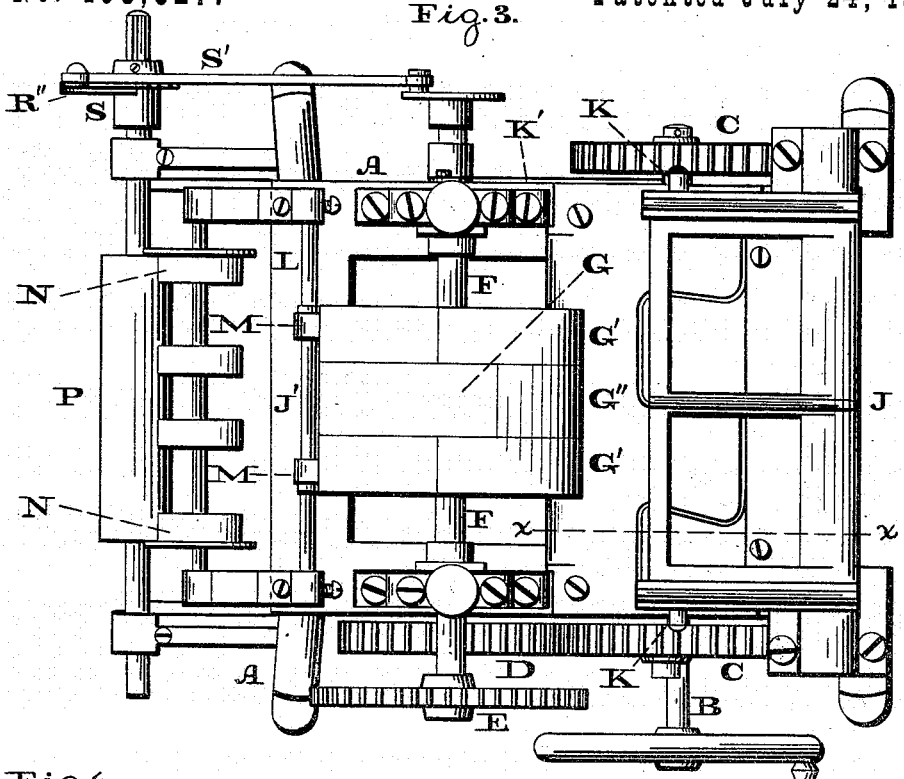


Fig. 6.

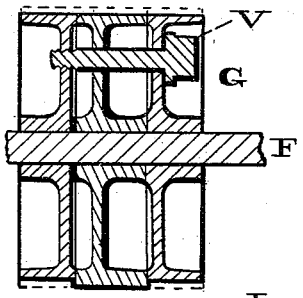


Fig. 4.

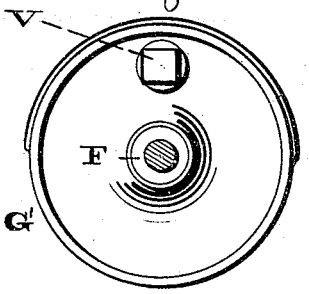


Fig. 5.

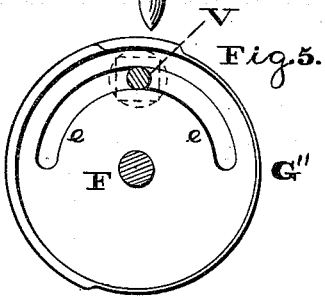


Fig. 10.

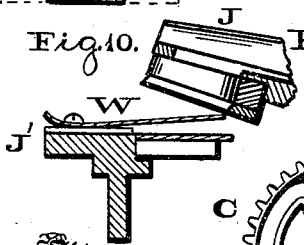


Fig. 7.

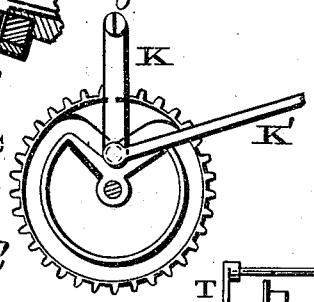
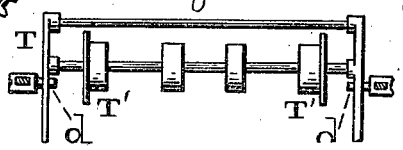


Fig. 8.

Fig. 9.



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UNITED STATES PATENT OFFICE.

EDWARD J. FROST, OF PHILADELPHIA, PENNSYLVANIA.

IMPROVEMENT IN MACHINES FOR CUTTING PAPER, ENVELOPES, &c.

Specification forming part of Letters Patent No. **193,327**, dated July 24, 1877; application filed November 20, 1876.

To all whom it may concern:

Be it known that I, EDWARD J. FROST, of the city and county of Philadelphia, and State of Pennsylvania, have invented a new and useful Improvement in Machines for Cutting Paper, Envelopes, Collars, Boxes, &c.; and I do hereby declare the following to be a clear and exact description of the nature thereof, sufficient to enable others skilled in the art to which my invention appertains to fully understand, make, and use the same, reference being had to the accompanying drawings, making part of this specification, in which—

Figures 1 and 2 represent end and side elevations, respectively, of the machine embodying my invention. Fig. 3 is a top or plan view thereof. Figs. 4 and 5 are side elevations of sections of the feeding-drum. Fig. 6 is a diametrical section of the feeding-drum. Fig. 7 is a side elevation of the cutters, operating wheel, and arm. Fig. 8 is a side elevation of a cam that prevents return of the sheet toward the reel. Fig. 9 is a top view of the take-up of the slack of the sheet. Fig. 10 is a longitudinal section of a portion in line *x x*, Fig. 3.

Similar letters of reference indicate corresponding parts in the several figures.

My invention consists of mechanism for starting the feed, or preparatively unrolling the sheet from the reel in advance of the cutting operation.

It also consists of means for taking up the slack of the sheet from the reel.

It also consists of a continuously-rotating drum, feeding at intervals, and rendered adjustable to the required length of the sheet or strip to be cut.

It also consists of cams for automatically preventing the return of the sheet toward the reel.

It also consists of a cutter having a positive motion and operating with a draw-cut.

It also consists of a stripper for preventing the rising of the uncut sheet.

Referring to the drawings, A represents a frame mounted on suitable legs or feet, and supporting the working parts of a machine. B represents a shaft carrying pinions, which, by means of gear-wheels C D E, impart rotary motions, in opposite directions, to two shafts, F F, which extend parallel one above the other, the upper shaft carrying a drum, G, and the lower shaft a drum, H, the said shafts and gearing being properly mounted on the frame A and continuously rotating. At one end or side of the upper portion of the frame A there is mounted the cutter J, consisting of a head having at one side a blade or cutting-edges, the counterpart of which is blades or cutting-edges on the table J′, and at the opposite side having journals *a*, whereby said cutter will have an axial motion. In order to impart motion to the cutter there is attached to the head at each side, opposite to the axis, an arm, K, each of whose lower ends carries a wrist-pin or roller, which engages with a cam-groove on the inner face of the gear-wheel C, which receives power from the shaft B, as has been stated.

Above the table J′, at the side opposite to the cutter, there is mounted a shaft, L, from which are suspended gravitating or spring-pressed feet or cams M, whose lower faces are adapted to come in contact with the table J′, and be stopped thereby in the direction from the drum G, but they have free motions toward the drum. Adjacent to the cams there are secured to the frame A, guiding-rollers N, and below the same is a reel, P, on which will be rolled the sheet to be cut. On the shaft of the reel there is secured a ratchet, R, with which engages a pawl, R′, suspended from an arm, R″, of a collar, S, loosely fitted on said shaft, said collar receiving reciprocating rotary motion by means of an oscillating arm, S′, to which power will be communicated from the shaft of the drum H or other movable portion of the machine. Below the shaft of the reel there is mounted a gravitating frame or arm, T, which extends inwardly, and has at the end opposite to its axis a series of guide-rollers, T′. The downward motion of the frame T is limited by stops *d* projecting from the adjacent portion of the supports of the frame A.

The drum G is made of parallel sections G′ G″, and a portion of the periphery of each section is raised above the remaining portion.

The inner section G″ is movable on the shaft F, to which it is fitted, and provided with a curved slot, *e*, extending between the periphery and center, and through the same is passed a screw-bolt, V, which also passes through the side sections G′, whereby the central section may be adjustably moved and afterward securely held to the side sections, and the several sections rotate as one.

Above the table J′ and between the drum G and cutter J there is a spring-plate, W, which extends horizontally above said table, with an intervening space, through which the sheet to be cut will be passed, and after the cut has been made said plate acts as a stripper for preventing the rising of the uncut portion of the sheet.

The operation is as follows: The sheet which has been rolled or wound on the reel P is first passed under the guide-rollers T′ of the gravitating-arm T, then over the rollers N and between the cams M and table J′ to the feed-rollers G H. Power being applied to the shaft B, the machine will be set in motion, the cutter being in its lowest position. The pawl R′ rides loosely over the ratchet R in one direction, and engages with the teeth thereof in the return direction, whereby in the latter case, a length of the sheet will be unrolled. The cutter now ascends; the forward end of the sheet, forced in between the rollers G H, so as to be caught by them, will be carried forward and directed between the table J′ and spring-plate W to a proper position under the cutter, which then descends and cuts or shapes the sheet as required or necessary. Meanwhile the reel continues to rotate intermittingly, and unwinds a sufficient length of the sheet for the next cutting operation.

It must here be noticed that the raised surfaces of the drum G, aided by the drum H, carry forward the sheet to the cutter; but as soon as the unraised surface thereof arrives at the portion of the sheet which rests on the lower drum, and said unraised surface does not rotate in contact with the sheet, it is evident that the sheet has a rest or dwell at intervals, and this occurs during the cutting operation, the drum and the cutter being adjusted relatively to each other. After the ascent of the cutter the raised surfaces of the drum again take hold of the sheet and advance it to the cutter, after which the rest or dwell of the sheet occurs; then the cutter descends, and the several operations are repeated as long as requisite or desirable.

In order to increase or decrease the length of the sheet fed to the cutter, the screw V of the drum G will be loosened, and the middle section G″ moved on the shaft F in one direction, so as to shift the point of commencement of the raised surface of said middle section farther from the point of commencement of the raised surfaces of the side sections G′, whereby there will be a greater continuous length of the raised surfaces of the entire drum G, and consequently a greater length of sheet fed to the cutter. But by moving the middle section in the opposite direction, the continuous length of the raised surfaces of the entire drum will be shortened, whereby there will be a less feeding-surface of the drum, and consequently a decrease in the length of the feed to the cutter. It is evident that by this construction also provision is made for increase or decrease of the intervals of rest or dwell of the sheet during the cutting operation.

The gravitating-arm T holds the sheet properly taut during the feeding operation, and if the length of the sheet unrolled is in excess of requirement or adjustment of the feed and cutter, the frame will fall and take up the slack.

The cams M automatically hold the sheet in the direction toward the reel and prevent its return thereto; but the forward motion of the sheet is not interfered with by the cams, as the latter liberate themselves by the said forward motion.

As the cutter-head has an axial motion, the cutter or blade or portions thereof near the heel of the head reach the sheet and cut the same, the remaining portion of the cutter or blade, or blades, advancing successively after the order of a draw-cut. Moreover, the cutter-head has a positive motion, the cam-grooves of the wheels C being of such shape that, at a certain portion of the rotation of said wheels C, there is a "dwell" of the cutter, and at another portion a quick descent thereof, whereby there is a rapid and clean cut, and then a quick ascent, whereby the cutter is in position for permitting immediate advance of the sheet to full extent thereunder.

In order to cause the arms K that are connected to the cutter-head to make their motions steady and uniform, they have pivoted to them rocking arms K′, whose axes are on the sides of the frame A.

Having described my invention, what I claim as new, and desire to secure by Letters Patent, is—

1. The paper-carrying reel of a paper-cutting machine positively rotated to unroll the sheet in advance of the cutting operation, substantially in the manner and by the pawl-and-ratchet mechanism described.

2. The reel and drums G H, in combination with the automatic take-up mechanism T T′ *d*, substantially as shown and described.

3. The feed-drum G, constructed of sections G′ G″ G′ each having a portion of its periphery raised, and one of such sections, G″, having a slot, *e*, and the other sections, G′, having bolt-holes, through which and the slot *e* a bolt is passed to unite the three sections and cause them to act as one, the said slotted section permitting of the relative adjustments of the raised portions of the peripheries of said sections, substantially as and for the purpose specified.

4. The reel and feed-drum, in combination with the cams M, substantially as and for the purpose set forth.

5. The cutter J, in combination with arms K, cam-grooved gear C, and table J′, substantially as shown and described.

6. The stripper-plate W, under which the paper is fed to the cutter, in combination with said cutter, table J′, and feed mechanism, substantially as described.

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