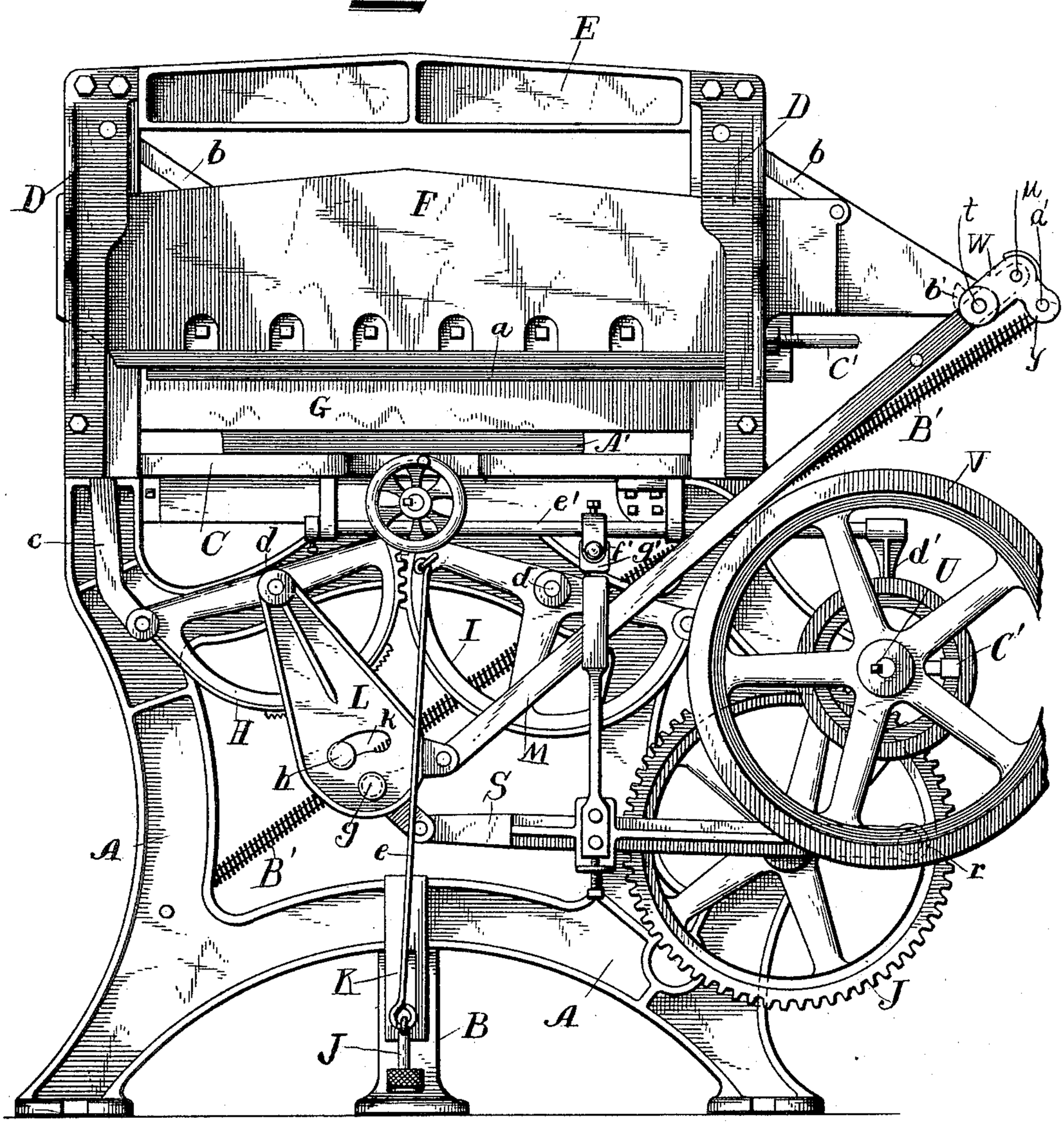
(No Model.) 3 Sheets—Sheet 1.

C. SEYBOLD.

PAPER CUTTER.

No. 581,779. Patented May 4, 1897.

Fig. 1.



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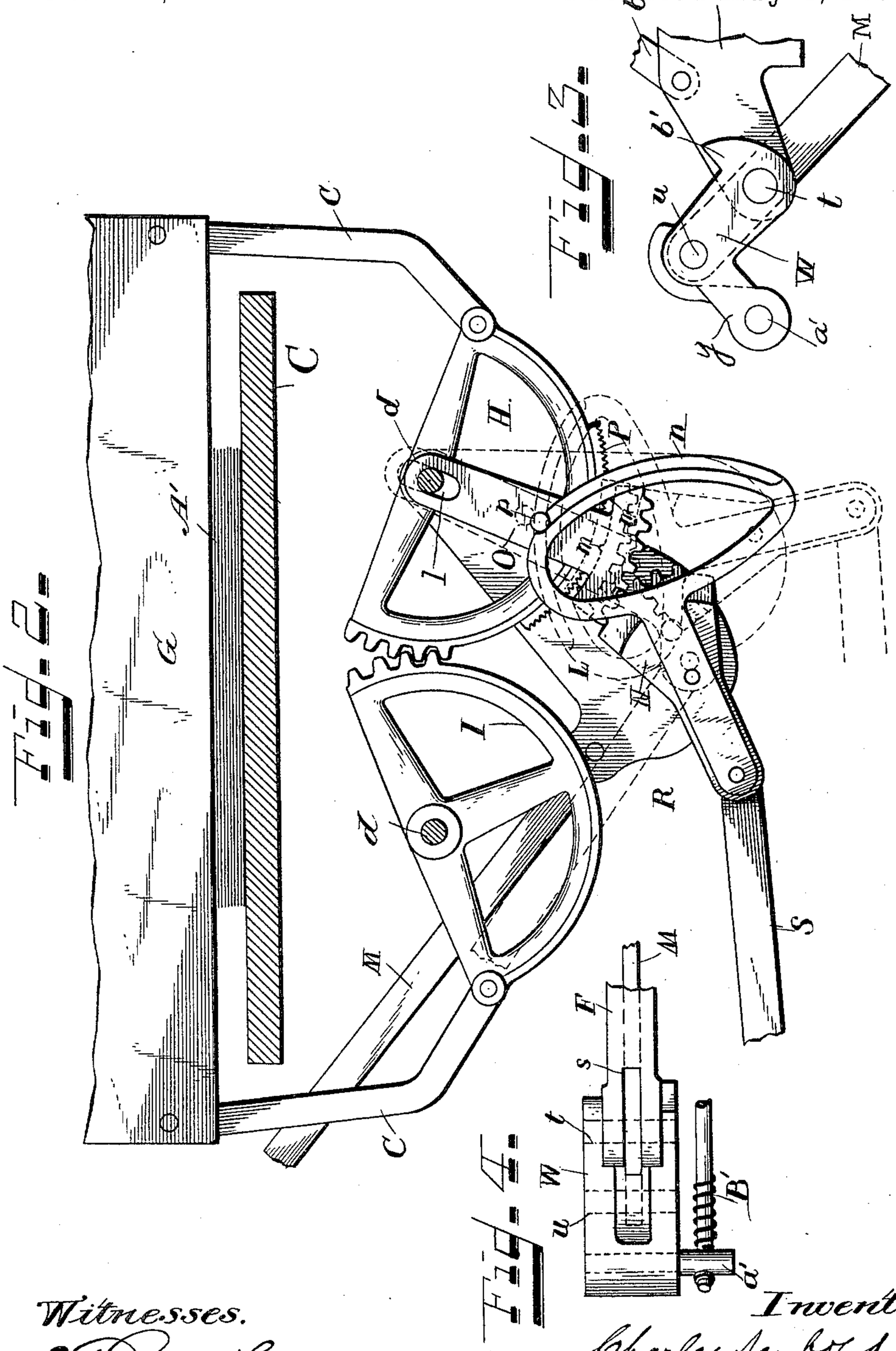

FIG. 2.

FIG. 3.

FIG. 4.

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3 Sheets—Sheet 3.

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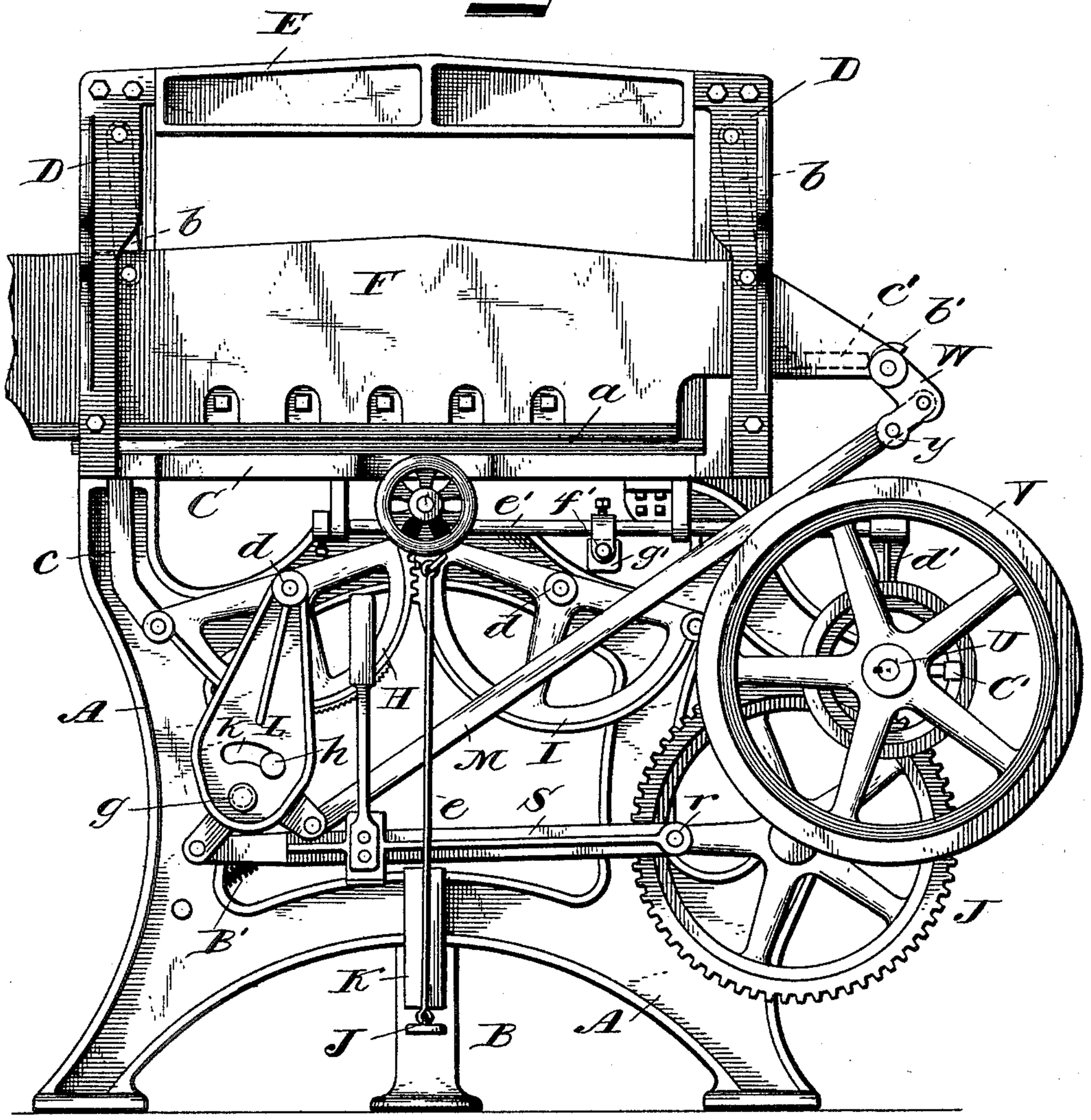
Fig. 5.



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UNITED STATES PATENT OFFICE.

CHARLES SEYBOLD, OF DAYTON, OHIO, ASSIGNOR TO THE SEYBOLD MACHINE COMPANY, OF SAME PLACE.

PAPER-CUTTER.

SPECIFICATION forming part of Letters Patent No. 581,779, dated May 4, 1897.

Application filed February 17, 1896. Serial No. 579,613. (No model.)

To all whom it may concern:

Be it known that I, CHARLES SEYBOLD, a citizen of the United States, and a resident of Dayton, in the county of Montgomery and State of Ohio, have invented certain new and useful Improvements in Paper-Cutters, of which the following is a full, clear, and exact description, reference being had to the accompanying drawings, forming part of this specification.

My invention relates to machines for the cutting and trimming of paper, and has special relation to that class of machines in which an automatic clamp is employed for clamping and holding the paper in connection with the cutting-knife.

In paper-cutting machinery it is very essential that powerful pressure shall be brought to bear on the paper to clamp it tightly, or the paper is very apt to slip under the cutting strain, and as a consequence in machines of the class under consideration the operating parts are usually of massive and powerful construction to enable them to withstand the strain and exert the necessary pressure. Machines heretofore constructed for the smaller classes of work have therefore of necessity either been so large, cumbersome, or complicated as to be unsuited for the purpose, or they have been so cheaply constructed as to be ineffective.

It is the purpose of the present invention to supply a machine of great simplicity of design and lack of complicated parts and one in which a minimum amount of power is required to perform the work demanded.

In order to obtain the requisite amount of clamping power without complication of parts or massiveness of design, I fulcrum the mechanism for operating the knife on the clamp and consequently through the clamp on the paper to be cut, so that before the knife will operate at all the clamp must exert its pressure on the paper and so that the duller the knife or the tougher the paper the greater the pressure exerted by the clamp. This forms one of the most important features of my invention.

Another feature of my invention consists in the construction and arrangement of parts whereby the clamp, when the machine is not in operation, will be disconnected from the knife-operating means to enable a ready adjustment of the clamp to correspond with the varying thicknesses of the piles of paper to be cut and of the means employed for positively coupling the knife and clamp the moment the machine is thrown into operation.

A third feature of importance consists in the means employed for preventing any release of the clamping power and consequent possible shifting of the paper until the knife has completed its stroke and cut through the last sheet of paper to be cut. It is evident that inasmuch as the fulcrum of the knife-lever is on the paper to be cut the precise point of this fulcrum will depend on the quality of paper to be operated upon. With soft spongy paper the clamp will descend lower than with stiff hard paper, and as a result, unless some means were employed to prevent it, the knife in certain cases will have more shear than in others, because the machine must be so constructed that the knife will always complete its stroke. When with the last few sheets of paper the shear of the knife is considerable, it is apt to cut so easily that the clamp-pressure is not maintained and the shear of the knife is very apt to shift the paper instead of cutting it. It is to remedy this defect that I have provided means to be hereinafter pointed out and claimed whereby the action of the knife on the paper can never be such as to release the clamp-pressure or cause the sheets to slip laterally.

There are various other features of novelty in construction and in combination of parts which will be hereinafter more particularly pointed out and claimed.

In the drawings, Figure 1 is a front elevation of my improved machine at the beginning of the operation. Fig. 2 is a rear view of a portion of the machine, showing the method of coupling the knife-driving mechanism to the clamp-operating devices, the final position of the parts being shown in dotted lines. Fig. 3 is a detail rear view of the outer end of the knife-bar, showing the method of coupling the knife to its pulling-bar. Fig. 4 is a top plan view of the parts shown in Fig. 3. Fig. 5 is a front elevation of the machine at the end of the operation.

The frame of the machine, upon which the operating parts are mounted, consists of a standard A, preferably cast in a single piece, and a rear central leg or brace B, which supports the rear end of the table C and also acts as a brace for the frame. The operating parts being all mounted on the standard A, it will be seen that with this construction of frame by removing the table and back leg B the entire machine can be readily carried through very narrow places and that the machine itself occupies but a small space.

Securely bolted to the frame A are the upright standards D D, which are in turn braced and bolted together by the cross-beam E.

F is the knife bar or carrier, to which the knife *a* is bolted in the usual way. This knife-bar is swung on arms or links *b b*, pivoted to the upper ends of the standards D D, the knife-bar being guided and descending with a shearing cut in vertical slots or ways in the ends of the standards. G is the clamp, of suitable size and weight, guided on the standards D D and supported at each end by the links *c c*. These links *c c* are coupled to the outer ends of two intermeshing segment-gears H and I, which are journaled on stud-bolts *d d*, mounted on one of the cross-braces of the frame A, so that upon the rotation of the segment-gears the clamp will be raised or pulled down with equal power at each end. J is a foot-treadle connected with one of these segment-gears at its inner end by the connecting-rod *e*, so that when it is desired to raise the clamp for adjusting the paper to be cut the operator steps on the treadle, thus rotating the segment-gears downward and raising the links *c*, and with them the clamp. The treadle-bar J passes through a slotted plate K, secured to the central portion of the frame A, and this plate is provided with an offset or shoulder in the usual way to hold the treadle down and the clamp up while adjusting the paper A′. When the paper is adjusted, the foot-treadle is released, allowing the clamp to descend by its own weight upon the paper, it being of course understood that during this adjustment of paper and clamp the segment-gears are entirely disconnected from the driving mechanism of the machine, as will be hereinafter explained.

Pivoted outside of and on the same stud-bolt *d* as the segment-gear H is a guide-lever L, at the lower end of which is an eye to which the pulling-bar M is pivoted. On the inner face of this guide-lever L is a stud-bolt *g*, upon which is pivoted the toothed segment N. This segment also carries a stud *h*, which rides and is guided in a segment-slot *k* in the guide-lever L. The toothed segment N meshes with a similar segment O, the upper end of which is slotted at *l* and is mounted on the same stud-bolt *d* with the segment-gear H.

When the machine is not in operation, the toothed segment O drops by its own weight within the limits of the slot *l*, and this segment is entirely disconnected from the segment-gear H. The periphery or face of the gear H, however, is provided with a set of fine teeth P, and the inner adjacent face of the toothed segment O is also provided with a few teeth *m m*. Securely bolted to the back of the toothed segment N is a cam-lever R, provided with a segmental cam-face *n*, which has a bearing against the roller *p* on the segment O. It will be evident from this that the moment the segment N is shifted by the driving mechanism, as hereinafter described, the segment O will be thrown up and the teeth *m* will lock with the teeth P on the segment-gear H, and further oscillation of the segment N will drive the segment-gear H, the segments N and O remaining constantly in mesh and the segmental cam-lever riding along the roller *p*, as shown in dotted lines, Fig. 2. The throw of the segment O upward to lock same to the segment-gear H is positive and direct, and the construction is such that a very slight oscillation or shifting of the segment N will at once lock the segment O to the segment-gear H. Were any other arrangement employed resulting in any other than a direct positive throw of the segment O to lock it to the gear H, the locking-teeth on the two pieces might easily catch on their points and fail to intermesh, and there would necessarily be some slip in the operation of the machine. This feature, therefore, whereby a direct positive intermeshing of the parts is obtained, forms one of the important parts of my invention.

Coupled to the lower end of the toothed segment N is the driving-rod S, which is pivoted at the other end on the crank-pin *r*, secured to the cogged gear-wheel T, which in turn is mounted on a stud-shaft secured to the frame A. The gear-wheel T meshes with a pinion on the driving-shaft U, which shaft also carries the driving-pulley V, by means of which power is applied to the machine by belt in the usual way. It will be seen, therefore, that when the power is applied the driving-rod S at once begins to actuate the segment N, which locks the segment O to the segment-gear H, and the segment-gears H and I are rotated upward, where they intermesh, thus pulling down the links *c c* and bringing the clamp to bear with great pressure on the paper A′, it being understood, of course, that before the machine is operated at all the operator has adjusted the paper and released the foot-treadle J, so that the clamp rests on the paper by its own weight. The segment-gears will continue to rotate under the action of the driving-rod S until the paper is compressed by the clamp G within the limits of the power of the machine; but as soon as all the sponginess is pressed out of the paper and it presents a solid resistance to the clamp the further rotation of the gear-wheel T and thrust of the driving-rod S will begin to shift downwardly the guide-lever L and the segment N, and the pulling-bar M will be drawn downward. This pulling-bar M is coupled to the

knife-bar in the following manner: The outer end of the knife-bar is slotted, as shown at *s*, Fig. 4, and outside of this slot the bell-crank casting W is pivoted on the pins *t t*. The end of the pulling-bar M passes through the slot in the end of the knife-bar and is pivoted to the casting W by the pin *u*, and while in its working position the two pivotal points *t* and *u* are in a direct line with the point of attachment of the pulling-bar to the segment N, so that the pulling-bar can exert its full power on the knife-bar, swinging it downward with a shearing cut.

The casting W is provided with a downwardly-extending arm *y*, which carries a pin *a'*, while B' is a coiled spring having a bearing between this pin and a stud on the frame A near its base. The function of this spring B' is threefold. It holds the casting W in the position shown in the drawings, with the two pivot-pins *t* and *u* in line with the pulling-bar. Second, it sustains the weight of and holds up the knife-bar until the machine begin its work. This is necessary because until that time the segment N is disconnected from the segment-gear H. Its third function is to return the casting W to its normal position, as will now be explained.

It will be evident from the construction already explained that the work done by the driving-rod S under the rotation of the gear-wheel T is first expended in forcing down the clamp G upon the paper to be cut, and then it begins its action on the pulling-bar M. Now the amount of movement of the crank-pin *r* and rod S taken up in operating the clamp will depend, of course, on the character and quality of the paper operated on. With spongy paper the clamp G would be forced down farther than with hard stiff paper. It is further evident that it is essential to so proportion the parts that the knife will under any circumstances make a complete cut. It will therefore follow that if the pulling-bar were coupled directly to the knife-bar the throw of the knife, inasmuch as it swings segmentally, would under certain conditions have much greater shear than down cut, and as a result the last few sheets of paper might be shifted sidewise instead of cut by the push or shearing stroke of the knife, especially as the fulcrum of the knife is on the paper and the easier the knife cuts the less power is brought to bear on the clamp. To remedy this possible defect, I employ the casting W intermediate the pulling-bar and the knife-bar and provide a cam *b'* on the castings. The links *b* are of such length that when the knife has reached a position in which the side shear and the down cut are about equal this cam *b'* comes in contact with the trip-stud *c'*, extending out from the standard D, and the casting is turned on its pivots, so that the pivot-pins *t* and *u* are no longer in line with the pulling-bar and the further operation of the pulling-bar has no further effect on the knife, but only turns the casting against the pressure of the spring B', and as soon as the pulling-bar has reached the limit of its stroke the spring returns the casting to its normal position. The parts are also so proportioned that the knife will have reached the table and completed its operative stroke at the moment the cam comes in contact with the trip-stud. With this construction, therefore, the quality of the paper can have no effect on the operation of the knife, as the shear of the knife can never be greater than the down cut.

I have already mentioned that the machine is driven by belt on the pulleys V, but for small machines the pulley can also be turned by hand, as will be readily understood; but whether the machine is driven by hand or power it is desirable that it be automatically stopped at the completion of each stroke to enable the operator to remove the severed portions and to turn the paper for a new cut. To accomplish this result, I employ a split expansion-band friction-clutch of the ordinary construction, (shown at C', Fig. 1,) the band-pulley running loose on the driving-shaft until the friction-clutch is thrown. This is done by the arm *d'*, mounted on the shaft or rod *e'*, journaled in lugs extending down from the base of the table. Secured to this shaft *e'* and extending out horizontally is the hand-lever *f'*, by raising which the shaft is rotated, and the arm *d'* throws the friction-clutch into operation. The opposite end of the hand-lever on the rear side of the shaft *e'* has a downwardly-extending block *g'*, while a vertically-extending arm *h'* is secured to the driving-rod S, the parts being so proportioned that just before the completion of the stroke of the driving-rod the arm *h'* will come in contact with the block *g'*, shift the shaft *e'* and arm *d'* in the other direction, and throw out the friction-clutch, thus stopping the machine automatically.

D' is a hand-wheel which operates by means of a screw the usual gage for the paper.

In describing above the mechanical parts of the machine I have probably also made sufficiently clear the operation of the cutter. The machine being at rest, the operator raises the clamp by the foot-treadle. Having adjusted the paper, he allows the clamp to descend to the paper by its own weight. Then, starting the machine with the hand-lever *f'*, the cam-lever R at once locks the toothed segment O to the segment-gear H. The segment-gears are rotated, bringing the clamp to bear upon the paper until it can descend no farther. Then the driving mechanism begins to act on the knife-pulling bar, and as the knife begins to cut the greater the resistance, either on account of dullness of knife or toughness of paper, the greater the pressure of the clamp, because the fulcrum of the knife is on the clamp and through it on the paper, and until the clamp ceases its downward movement the knife will not operate at all. It will be understood, of course, that

while I have shown and described the knife-carrier as pivoted on links to the standards the same movement of the knife can be obtained by forming diagonal slots in the knife-carrier, through which studs on the frame pass, so that when the knife-carrier is pulled downward by the pulling-bar the knife will descend with a shearing cut. Therefore I do not wish to be limited to this particular arrangement, as other methods of obtaining a downward shearing cut can of course be readily substituted for the particular arrangement shown.

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

1. In a paper-cutter, the combination with a clamp and cutting-knife, of a pair of intermeshing segment-gears with links connecting same to said clamp, mechanism for operating said knife normally out of connection with said segment-gears, and coupling device to couple said knife-operating mechanism with said segment-gears, substantially as shown and described.

2. In a paper-cutter, the combination, with a clamp and cutting-knife, of a pair of intermeshing segment-gears, with links connecting same to said clamps, a wheel provided with a crank-pin and means for driving said wheel, a driving-rod and guide-lever with connecting device coupling the crank-pin to said segment-gears and a pulling-bar connecting said knife with said guide-lever, substantially as shown and described.

3. In a paper-cutter, the combination with a clamp and cutting-knife, and separate mechanism for actuating said knife and clamp, of a pair of toothed segments normally out of contact with each other, cam-lever secured to one of said segments and roller on the other segment bearing against said cam one of said toothed segments being coupled to the knife-actuating mechanism and the other provided with means for locking itself to the clamp-operating devices whereby upon the operation of the machine, said separate mechanisms will be coupled together and the cutting-knife find the fulcrum of its leverage on the paper to be cut, substantially as shown and described.

4. In a paper-cutter, the combination with the frame, of a cutting-knife and knife-carrier therefor with means connecting said carrier to the frame, so that said knife will have a downward shearing cut, pulling-bar with driving mechanism acting thereon to operate same, bell-crank lever to which said knife-carrier and said pulling-bar are respectively pivoted with their pivots normally in line with the draft of said pulling-bar, and means for tripping said crank-lever to throw said pivots out of line whereby the draft of the pulling-bar may be transferred from said knife-carrier to said crank-lever, substantially as and for the purpose described.

5. In a paper-cutter, the combination with the frame, of a cutting-knife and knife-carrier therefor with means connecting said carrier to the frame, so that said knife will have a downward shearing cut, pulling-bar with driving mechanism acting thereon to operate same, bell-crank lever to which said knife-carrier and said pulling-bar are respectively pivoted with their pivots normally in line with the draft of said pulling-bar, cam on said crank-lever with trip-stud on the frame to throw said pivots out of line with spring acting on the other arm of said crank-lever, to hold in normal position said lever and said knife-carrier and to return said lever to its normal position when released by the trip-stud, substantially as shown and described.

6. In a paper-cutter, the combination of the supporting-frame, the table, the clamp-bar, and the knife-frame mounted above the table, geared segments journaled upon studs below the table, links coupling said segments to the clamp-bar and treadle, a link connecting the treadle to one of said segments for the purpose of elevating the clamp-bar and holding it in the elevated position, a swinging arm pivoted upon the journal of one of said segments, a pulling-bar coupling the lower end of said swinging arm to the knife-frame, a pair of intermeshing cogged segments one mounted to oscillate upon said swinging arm, the other adapted to be locked to one of the knife-bar-actuating segments and lock the segments and swinging arm together, a wheel having a crank-pin, and means for rotating said wheel and the connecting-rod coupling the crank-pin of said wheel to the lower arm of the segment, substantially as shown and described.

7. In a paper-cutting machine, the combination with the supporting-frame and table, of two geared segments, the reciprocating clamp-bar, rods at each end of the geared segments connecting the clamp-bar and segments, the swinging arm pivoted upon the journal of one segment, the cutter-frame fitted to swing diagonally above the table, a rod connecting the lower end of the swinging arm to the knife-frame, a toothed segment coupled to the swinging arm, and means such as shown for locking said segment to bring its teeth in gear with one of the segments that actuate the clamp-bar, whereby the swinging arm coupled to the knife-frame is actuated in its downward movement and the clamping-bar firmly pressed upon the paper, substantially as shown and described.

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