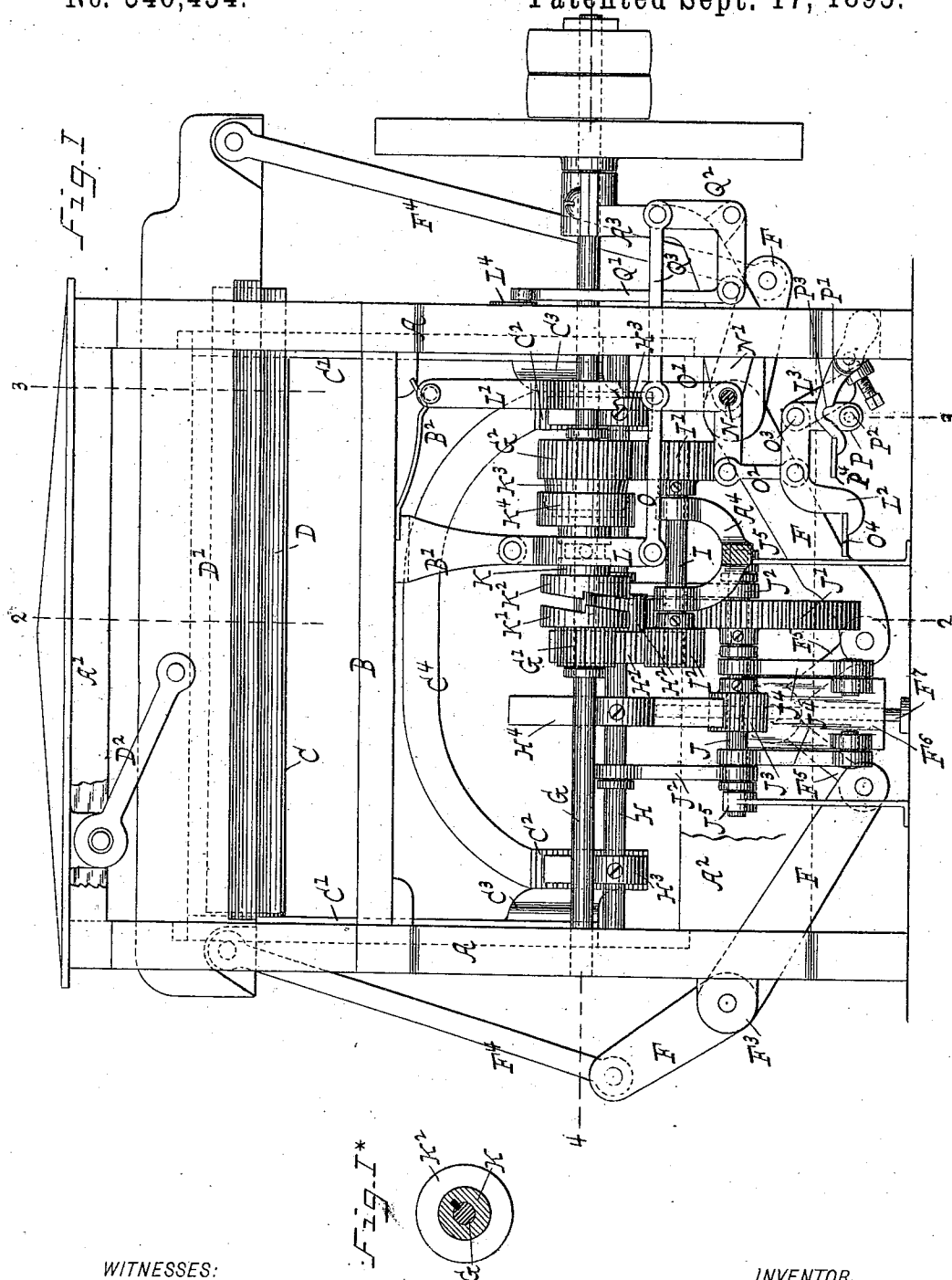


A. MALM.

SELF CLAMPING PAPER CUTTING MACHINE.

No. 546,454.

Patented Sept. 17, 1895.



WITNESSES:

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M. Slough

INVENTOR.

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(No Model.)

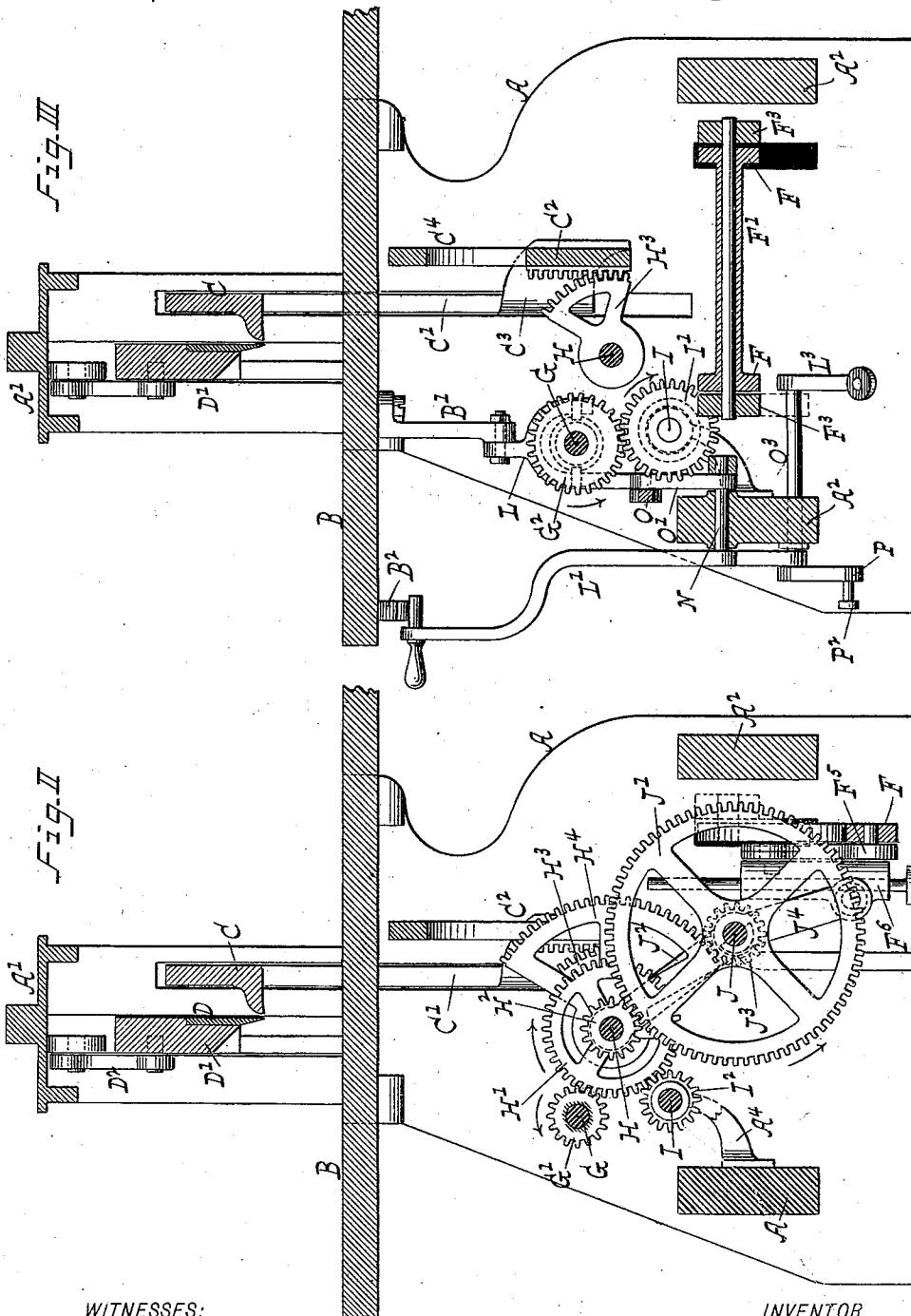
4 Sheets—Sheet 2.

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4 Sheets—Sheet 3.

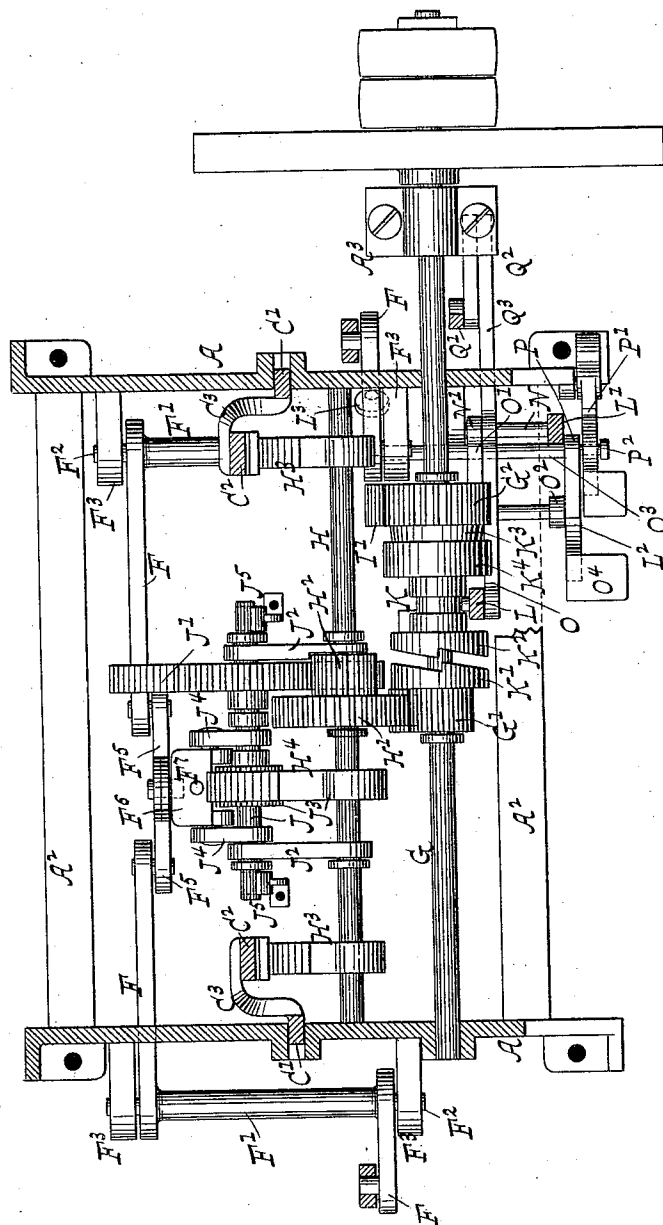
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Fig. IV



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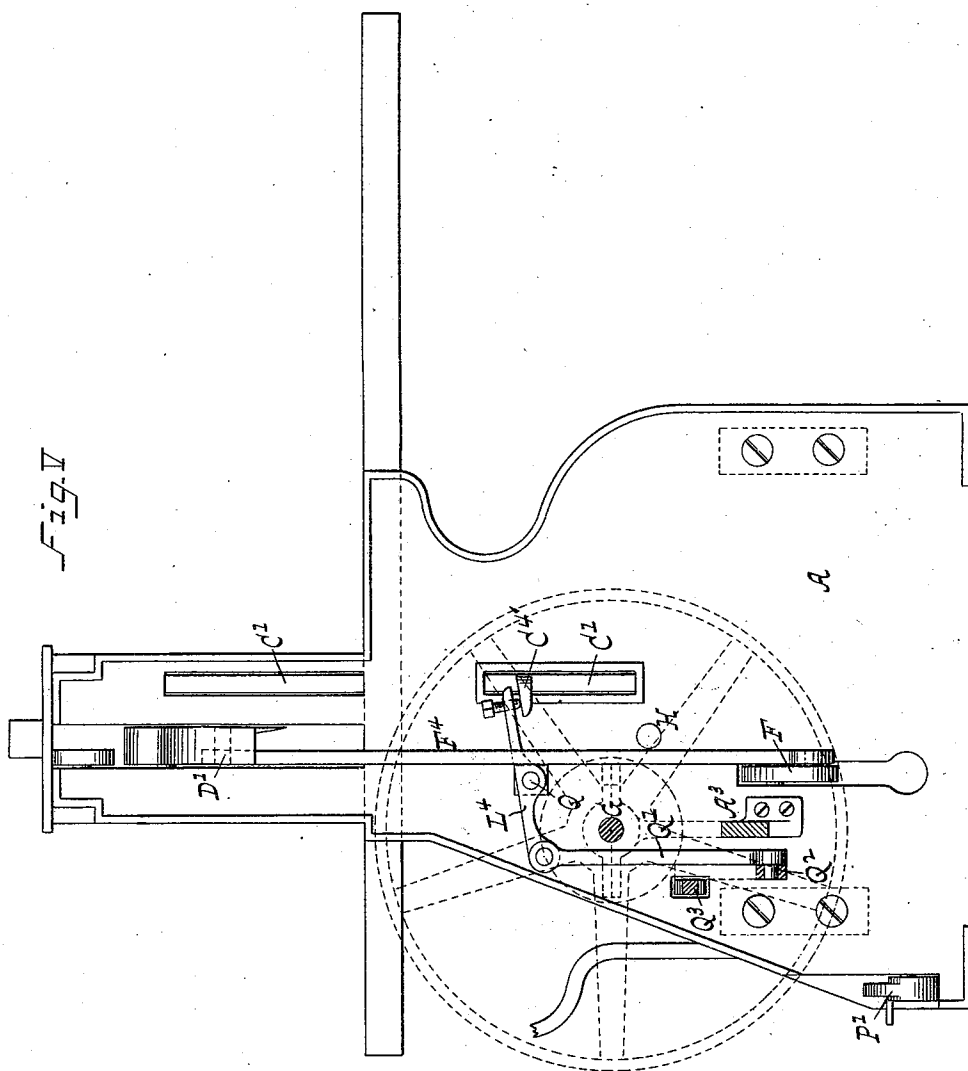
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UNITED STATES PATENT OFFICE.

ALEXANDER MALM, OF BROOKLYN, NEW YORK.

SELF-CLAMPING PAPER-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 546,454, dated September 17, 1895.

Application filed May 18, 1894. Serial No. 511,650. (No model.)

To all whom it may concern:

Be it known that I, ALEXANDER MALM, a citizen of the United States of America, residing at Brooklyn, in the county of Kings, in the State of New York, have invented certain new and useful Improvements in Self-Clamping Paper-Cutting Machines, of which the following is a specification.

This invention relates to that class of paper-cutting machines in which the mechanisms for moving the clamp for holding the paper during the cutting operation and moving the knife are connected in such manner that the resistance of the paper to the action of the knife reacts on the clamp for holding said paper, whereby such resistance is utilized and the pressure regulated somewhat by the resistance.

The object of this invention is to provide a simple, convenient, and effective machine of this character.

Figure 1 of the accompanying drawings represents a front elevation of this paper-cutting machine, a portion of the top bar of the machine being broken out. Fig. 1^x represents a cross-section of the driving-shaft and the clutch thereon. Fig. 2 represents a vertical transverse section of the machine on line 2 2 of Fig. 1. Fig. 3 represents a vertical transverse section of the machine approximately on the line 3 3 of Fig. 1, certain gearing being omitted in order to better expose other parts. Fig. 4 represents a horizontal section of the machine approximately on line 4 4 of Fig. 1. Fig. 5 represents an end view thereof partly in section.

Similar letters of reference indicate similar parts in the different figures.

The frame of this machine may be of any suitable construction. As shown, it comprises two end standards A and a top cross-bar A' connecting said standards, and front and rear cross-bars A², also connecting said standards. A cutting-bed B is supported in the frame. A vertically-movable paper-clamp C extends across over the bed B. This paper-clamp is provided at its opposite ends with dependent rods C', which are guided in ways or slots on the standards. These vertical rods C' are provided at their lower ends with lateral inwardly-projecting arms C³, provided with vertical racks C² disposed near the end standards. These racks C² are connected by

a bow-shaped bar C⁴, so that they move in unison. The knife-stock D', carrying the knife D, is guided in vertical ways of the standards, and is hung by a link D² to a lug depending from the top A' of the frame, whereby it is adapted to swing laterally to produce a draw-cut. The knife is connected at its opposite ends by links F⁴ to the outer ends of two knife-operating levers F. Each of these knife-operating levers preferably comprises two arms disposed in different vertical planes, as more clearly shown in Fig. 4, and joined by an elongated hub F', embracing a fulcrum-pin F², which is mounted in lugs F³, disposed on each of the standards of the frame. The inwardly-extending arms of the levers F are respectively connected, by means of links F⁵, to a vertically-movable slide F⁶, disposed on a rod F⁷ or other suitable guideway.

The main or driving shaft G is supported in bearings of the end standards and extends at one end beyond the frame, and has also a bearing on the bracket A³, attached thereto. This shaft is connected with any suitable source of power for keeping a continuous rotary motion during the operation of the machine. Two clutch-pinions G' and G² are mounted loosely on said shaft apart from each other, and provided on their inner sides with clutch-faces K' and K³, respectively. A double clutch K is disposed on the driving-shaft between the pinions G' and G², being provided with a clutch K², adapted to engage the clutch-face K' of the pinion G', and with a clutch-face K⁴, adapted to engage the clutch-face K³ of the pinion G². This clutch K is keyed to the main shaft G, as shown in Fig. 1, in such manner that it is adapted to slide longitudinally on said shaft and rotate with it. The clutch-faces may be simply friction-surfaces or interlocking clutch-faces. An arm L, hung to a bracket B' dependent from the bed B, is connected with the clutch K, and adapted to move said clutch in either direction on the shaft G. A shaft H, which I term a "setting-shaft," is disposed adjacent to the driving-shaft G parallel therewith. This shaft is supported in fixed bearings of the frame, and is provided with a loose pinion H', which meshes with the pinion G' of the driving-shaft G, and with two fixed segments H³, which mesh with the vertical racks C², which are connected with

the paper-clamp C. This shaft II is also provided with a fixed segment II¹.

Another shaft J, which I term an "auxiliary or climbing shaft," is supported in the outer ends of the swinging-arms J², which are hung loosely on the shaft II. This shaft J has a fixed pinion J³, which meshes with the segment II¹. It also has a large fixed gear-wheel J⁴, with which the loose pinion II² of the shaft II meshes. Two arms J⁴, hung on the shaft J, are connected at their outer ends to the vertical slide F⁶. A resetting-shaft I is supported in fixed bearings in the brackets A⁴, and provided at one end with a pinion I¹, which meshes with the pinion G² on the driving-shaft, and at the other end with a pinion I², which meshes with the pinion II¹ on the shaft II.

The clutch-shifting arm L is operated by either a hand-lever, a foot-lever, or automatically. A rod O connects its lower end with the vertical arm of an elbow-lever O', which is fulcrumed on an elongated pivot-pin N, supported in one of the frame-bars and in a lug N' on one of the standards. A hand-lever L' is fixed at its lower end to the outer end of the pivot-pin N. This lever stands normally in vertical position and is provided at its upper end with a handle by means of which it may be swung longitudinally in either direction, being held in its adjusted position by a curved spring B², which is attached to the under side of the bed-plate B and engages an inwardly-projecting pin on said lever. When the hand-lever L' is swung toward the left, as shown in Fig. 1, it turns the pivot-pin N to which the elbow-lever O' is fixed and the rod O is thereby shifted toward the left, causing the dependent clutch-lever L to swing also toward the left and carry the clutch K² into contact with the clutch-face K' of the pinion G'. A foot-lever L², provided with a foot-board O⁴, is fulcrumed on a pivot-pin O³, mounted in one of the bars of the frame and is connected with the elbow-lever O' by a link O². Either the hand or foot lever may be used by the operator for shifting the clutch. A reversing-lever L³ is fixed to the elongated pivot-pin O³ and operates to automatically reverse the clutch when the knife has completed its cutting-stroke. This lever lies in the same vertical plane with one arm of the knife-actuating levers F, and, when the knife approaches the lower end of its stroke, said arm of the knife-lever strikes the reversing-lever L³ and depresses it, whereby the pivot-pin O³ of the foot-lever L² is turned and motion communicated from said lever through the link O² to the elbow-lever O', thence to the rod O, which is shifted toward the right, causing the clutch to be disengaged from the clutch-face of pinion G' and the clutch K⁴ to become engaged with the clutch-face K³ of the pinion G², whereby the knife and clamp are raised. A stop mechanism for stopping the machine after the clamp and knife have been elevated to normal posi-

tions comprises a lever L⁴, fulcrumed on a pivot-pin Q attached to one of the standards, as shown in Fig. 5. One end of this lever L⁴ is in the path of a tappet C', on one of the clamp-bars C', and the other end thereof is connected by a rod Q' to one end of an elbow-lever Q². The other end of the elbow-lever Q² is connected by a link Q³ with the horizontal rod O heretofore described, the link Q³ being preferably integral therewith. When the clamp C approaches the upper end of its stroke, the tappet C⁴ strikes the upper end of the stop-lever L⁴ and lifts it, whereby the lower end of said lever is depressed and the rod Q' correspondingly depressed, causing the elbow-link Q² to swing on its pivot and push the rods Q³ and O toward the left a sufficient distance to release the clutch K from the pinion G', but leaving it in normal position.

The lever L² is provided at its rear end with a fixed dependent arm P, provided with a stud P². A locking-lever P' is pivoted near the foot-lever L² and provided with a foot-board P⁴. This locking foot-lever P' is provided with a double inclined lower face, having a notch P³ at the apex thereof, which is adapted to engage the pin P² on the dependent arm P. This lever P' is provided with a weight at its outer end, which tends to normally hold its inclined notched face out of contact with said stud; but when the attendant depresses the inner end of this lever by placing his foot on the board P⁴, the double inclined face engages the pin P² of the dependent arm of the foot-lever L² and swings said lever into central position, and holds it there by the notch P³, whereby the clutch K is moved into normal inactive position and held therein. The attendant can thus readily stop the machine at will at any point of its motion.

The operation of the machine will now be described. The clutch K being normally in inactive position between the loose clutch-pinions G' and G² and the paper to be cut having been adjusted on the bed B, the machine is started by depressing the foot-lever L², or swinging the hand-lever L' toward the left, whereby the clutch K engages the clutch-pinion G' and causes it to turn in the direction of its arrow in Fig. 2, and motion is thereby communicated to the gear-wheel II', which is loose on the shaft II, and thence through the pinion II², which is rigidly connected with the gear-wheel II' and also loose on the shaft II, to the gear-wheel J⁴, fixed on the shaft J, supported in the swinging arms J². The pinion J³, fixed on the shaft J and meshing with the segment II¹, fixed on the shaft II, causes said segment to swing downward and the shaft II to turn in the direction of its arrow in Fig. 2. This turning of the shaft II causes the two segments II³, which are fixed to said shaft and mesh with the racks C² to swing downward, whereby the clamp C is lowered until it comes in contact with the paper on the bed B. When the clamp C is

arrested in its downward movement by the paper on said bed, the downward swinging of the segments H^3 and H^4 ceases, and then the pinion J^3 , continuing to rotate through the motion-transmitting mechanism heretofore described, climbs up the segment H^4 , carrying with it the shaft J . This upward movement of the shaft J lifts through the links J^4 the slide F^6 . This upward movement of the slide actuates through the links F^5 the knife-actuating levers F , whereby the knife-stock carrying the cutting-knife is made to descend and perform its cut upon the paper on the bed B . When the cut is finished, one arm of one of the levers F strikes the reversing-lever L and actuates it, whereby the clutch K , through the mechanism hereinbefore described, is shifted out of engagement with the clutch-pinion G' and into engagement with the clutch-pinion G^2 . Motion is then transmitted from the pinion G^2 to the pinion I' on the resetting-shaft I , the motion being in the direction of the arrows adjacent to said pinions, as shown in Fig. 3, and the pinion I^3 imparts motion to the gear-wheel H' and its connected pinion H^2 , loose on the shaft H , in a direction opposite to that indicated by the arrows in Fig. 2. The pinion H^2 communicates motion to the gear-wheel J' , also in a direction opposite to that indicated by its arrow in Fig. 2. The pinion J^3 , moving in the same direction as the gear-wheel J' , causes the segment H^4 to swing upward into normal position. This upward movement of the segment H^4 causes the shaft H to turn with it and the segments H^3 to act on the racks of the clamp to lift said clamp to its normal position. When the clamp has nearly reached its normal position, it actuates the automatic stop-lever L^4 , whereby the clutch K is shifted out of engagement with the pinion G^2 into an inactive position between the said clutch-pinion and the clutch-pinion G' . When the clamp C has reached the end of its upward stroke, the shaft J is still rotated through the gear J' and pinion H^2 , and the pinion J^3 rides down on the rack H^4 , whereby the climbing-shaft J is lowered and the slide F^6 depressed, such depression of the slide actuating the knife-levers F in such a way as to raise the knife-stock D' and its knife D . All the parts are thus restored to their normal positions and the machine is ready to be started for another cutting operation after the same paper has been readjusted or other paper placed on the bed B .

I claim as my invention—

1. In a paper cutting machine the combination of a work bed, a movable clamp adapted to clamp the paper on said bed, and provided with a rack, a movable cutter adapted to cut the paper on said bed, a setting shaft, a segment fixed on said setting shaft and engaging said rack, a transmitting segment also fixed on said setting shaft, a movable auxiliary shaft journaled in swinging arms supported on said setting shaft, a pinion fixed on said auxiliary shaft and meshing with the trans-

mitting segment on the setting shaft for imparting motion thereto, a gear wheel fixed on said auxiliary shaft, a pinion loose on said setting shaft and meshing with said gear wheel, levers for actuating the cutting knife, connected with said auxiliary shaft, and means for actuating said loose pinion.

2. In a paper cutting machine the combination of a work bed, a movable clamp adapted to clamp the paper on said bed and provided with a rack, a movable cutter adapted to cut the paper on said bed, a setting shaft, a segment fixed on said setting shaft and engaging said rack, a transmitting segment also fixed on said setting shaft, a movable auxiliary shaft journaled in swinging arms supported on said setting shaft, a pinion fixed on said auxiliary shaft and meshing with the transmitting segment on the setting shaft for imparting motion thereto, a gear wheel fixed on said auxiliary shaft, a pinion loose on said setting shaft meshing with said gear wheel, levers for actuating the cutting knife connected with said auxiliary shaft, a gear loose on the setting shaft and connected with the loose pinion thereof, a driving shaft provided with a pinion meshing with said gear, a resetting shaft provided with a pinion also engaging said gear on the settingshaft, another gear loose on the driving shaft, a pinion on said resetting shaft meshing with the latter, and a clutch mechanism for operating either of the gears on the driving shaft to impart motion in either direction to the setting shaft.

3. In a paper cutting machine the combination with the clamp and knife of the knife levers, the slide, the main shaft provided with clutch pinions, as G' , G^2 , and double clutch as K , the setting shaft with the gear wheel, as H' , pinion as H^2 toothed clamp segments as H^3 , and toothed knife segments as H^4 , the clamp racks, as C^2 , the resetting shaft with pinions as I' , I^2 , and the auxiliary shaft with gear wheel as J' and pinion as J^3 , the whole adapted to operate substantially as described.

4. In a paper cutting machine, the combination with the clamp and knife, of the knife levers, rods as F^4 , connecting the levers to the knife stock, the slide, links as F^5 connecting the slide to the knife levers, the main shaft with clutch pinions as G' , G^2 , and double clutch as K , the setting shaft with gear wheel as H' , pinion as H^2 , toothed clamp segments as H^3 , and toothed knife segment as H^4 , the clamp racks as C^2 , the resetting shaft with pinions as I' , I^2 , the auxiliary shaft provided with gear wheel as J' , which meshes with the pinion H^2 on the setting shaft, and links as J^4 connecting the slide to the auxiliary shaft, the whole adapted to operate substantially as described.

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Witnesses:

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