(No Model.)

2 Sheets--Sheet 1.

E. P. DONNELL.

PAPER CUTTING MACHINE.

No. 383,714. Patented May 29, 1888.

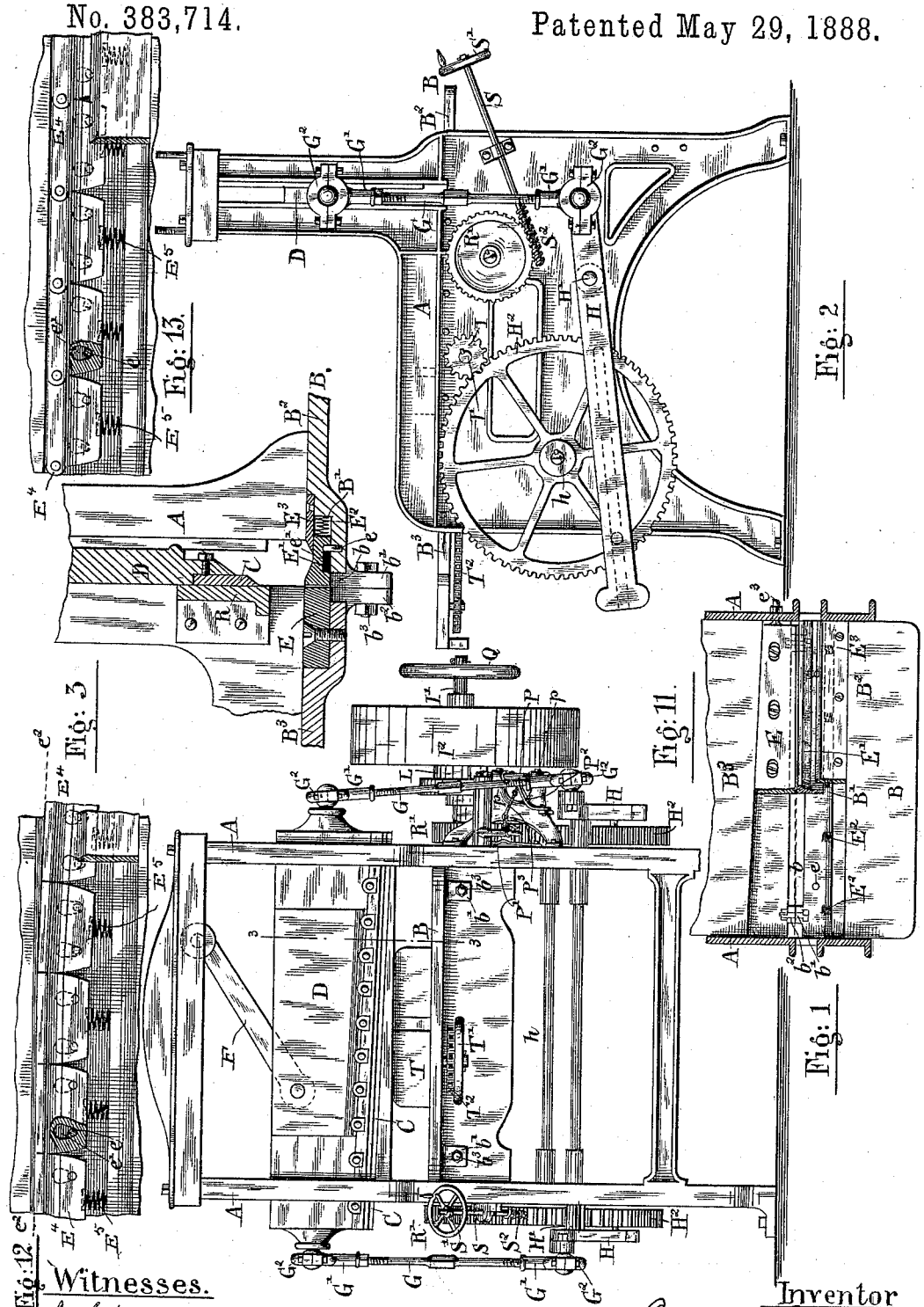

Fig: 13.

Fig: 2

Fig: 3

Fig: 11.

Fig: 1

Fig: 12

Witnesses.

Louis M. A. Whitehead.

C. C. Poole.

Inventor

Edward P. Donnell

by W. E. Dayton,

Attorney

(No Model.)

2 Sheets—Sheet 2.

E. P. DONNELL.

PAPER CUTTING MACHINE.

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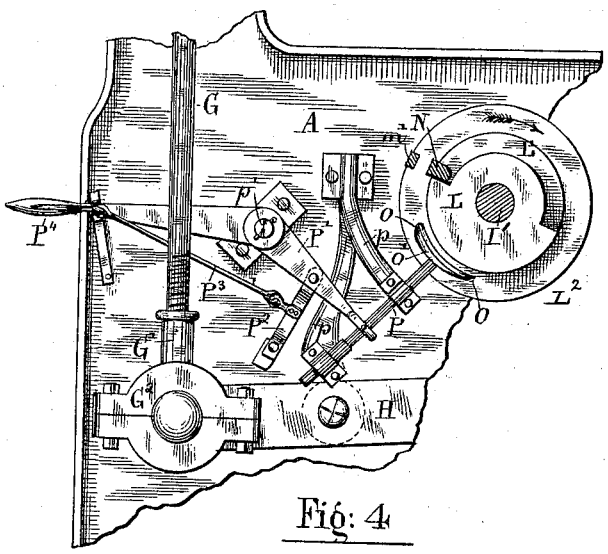
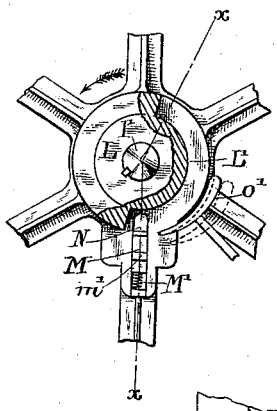


Fig: 4

Fig: 6



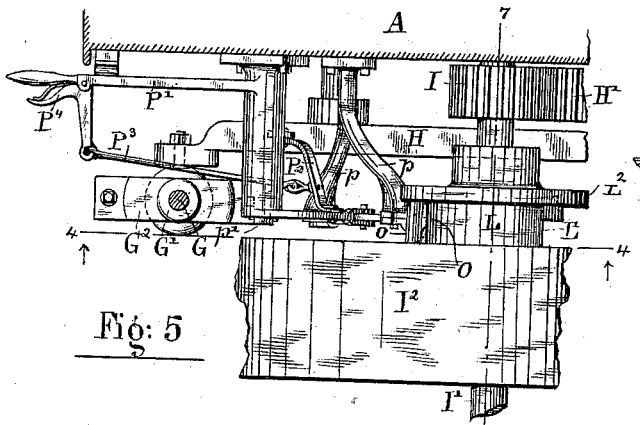


Fig: 5

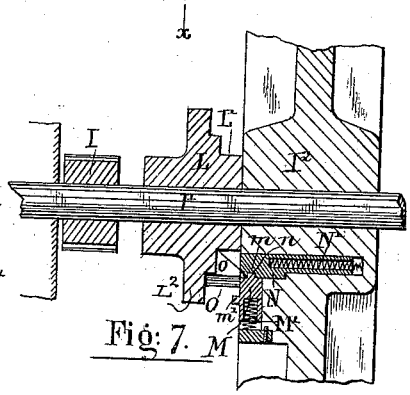


Fig: 7.

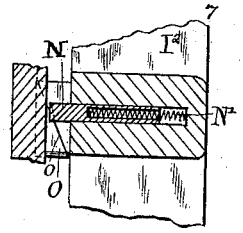


Fig: 9

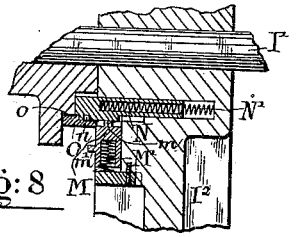


Fig: 8

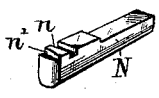


Fig: 10

Witnesses.

Louis M. F. Whitehead.

C. C. Poole

Inventor

Edward P. Donnell

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Attorney

UNITED STATES PATENT OFFICE.

EDWARD P. DONNELL, OF CHICAGO, ILLINOIS.

PAPER-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 383,714, dated May 29, 1888.

Application filed February 4, 1885. Serial No. 154,864. (No model.)

To all whom it may concern:

Be it known that I, EDWARD P. DONNELL, of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Paper-Cutting Machines; and I do hereby declare that the following is a full, clear, and exact description thereof, reference being had to the accompanying drawings, and to the letters of reference marked thereon, which form a part of this specification.

The object of this invention is to provide an improved construction in paper-cutting machines in several particulars, as will hereinafter appear; and it consists in the matters hereinafter described, and pointed out in the claims.

The machine herein shown as illustrating my invention is provided with a knife or cutter of that class shown in the prior patent, No. 290,004, granted to the me December 11, 1883, and which operates in connection with an opposing stationary knife, and is moved both downwardly and longitudinally, so as to carry its cutting-edge past the edge of the stationary knife.

The invention also comprises other novel and improved features of construction in a paper-cutting machine, as will be hereinafter described, and pointed out in the appended claims.

The invention may be more fully understood by reference to the accompanying drawings, in which—

Figure 1 is a front elevation of a paper-cutting machine embodying the features of my invention. Fig. 2 is a side elevation thereof. Fig. 3 is a vertical detail section on the line 3 3 of Fig. 1. Fig. 4 is a detail vertical section on the line 4 4 of Fig. 5, looking toward the body of the machine. Fig. 5 is a detail plan view mainly of the clutch mechanism and adjuncts at one end of the machine. Fig. 6 is a detail view showing in elevation the hub portion of the pulley-wheel, a clutch hub or collar fixed on a shaft alongside the pulley-wheel, and a double cam, a portion of the clutch *b* being broken away to more clearly show the parts. Fig. 7 is an enlarged detail section on the line 7 7 of Fig. 5. Fig. 8 is a detail section similar to Fig. 7, but showing the dog or sliding clutch member in its forward position. Fig. 9 is a detail section showing the dog engaged by the cam. Fig. 10 is a perspective of the dog. Fig. 11 is a detail plan of the shifting or movable section of the table and part of the stationary portion thereof. Figs. 12 and 13 are detail views of other forms of the said movable section of the table, as will be hereinafter described.

A represents the metal frame of the machine, which sustains a horizontal bed or table, B, upon which the paper to be cut is placed.

C is an upper movable knife or cutter, which is secured in the usual way to a knife or cutter-bar, D, arranged to work above the table; and E is a lower stationary cutter or bar by which the paper is supported adjacent to the movable cutter, which is, as herein shown, secured in the bed or table, but which may be formed by a part or edge of the table itself. The said bar E is preferably located with its front edge slightly back of the plane in which the cutting-edge of the upper knife, C, moves, so as to permit the said cutting-edge of the upper knife to pass below the plane of the bed or table without coming in actual contact with the edge of the said bar, which arrangement serves to prevent wear on the part either of the cutter or bar.

E′ is a laterally-movable metal bar, which is let into a depression, B′, formed in the table adjacent to the stationary bar E, so that the said movable bar constitutes a movable portion of the table in front of and adjacent to the said bar E. The said movable bar is held in position adjacent to the stationary bar by means of springs E^2, located, as shown, between the rear edge of the said movable bar and the adjacent wall of the recess, which is made of sufficient width to allow a necessary backward movement or yielding of the bar to allow the knife to pass between the said movable bar E′ and the stationary bar E.

The space between the bar E′, and the adjacent part of the table and the springs E^2 is shown covered by the plate E^3, set flush in the table at the forward side of the transverse depression, and arranged to extend back over a portion of the bar, said bar being made sufficiently thin at its front portion to enter beneath the covering-plate E^3, the upper surface

of which is located in the same plane with the higher rear edge portion of the bar E'.

The bar E' is held from actual contact with the stationary bar E, and preferably slightly forward from the path of the cutting-edge of the movable knife, by suitable stops, shown in the drawings in the form of pins *e*, fixed in the depressed part B' of the table, and engaged with short transverse slots *e'* in the bar E'. The said bar, which is adapted to yield backwardly, as described, may be moved away from the stationary bar in the descent of the movable knife by the action upon the inner face or other part of said bar of the inclined or beveled forward surface of the said movable knife or of other inclined surface upon the knife or knife-bar. When the said bar E' is thrown forward by an inclined surface other than that of the beveled part of the knife itself, the said bar may obviously be allowed to come in contact with the stationary bar E and the stops *e* may be dispensed with, inasmuch as the inclined parts in such case may be arranged to throw the said bar outwardly before the edge of the knife reaches the said bar E. In case, however, the said bar E is moved outwardly by the action of the beveled face of the knife itself upon the inner edge of the bar, it is obviously essential that a space should be left between the stationary bar E and the adjacent edge of the bar E', into which the cutting-edge of the movable knife may enter without contact with the said bar.

In the construction of the parts shown in Fig. 3 the said bar E' is so located, formed, or held by the stops *e* that when it is held by the springs E^2 at the farthest limit of its movement toward the stationary bar E the narrow space between the bar and the stationary bar E is wider at one end than at the other.

To permit the movement of the bar E' above described, the said bar is of course adapted to move independently at its ends; or, in other words, any guides or other means for causing a parallel movement in said bar are dispensed with, so that one of its ends may yield outwardly, as above described, without moving the said bar away from the stationary bar E at its opposite end.

The form of the bar E', above referred to, and illustrated in Fig. 11, has the disadvantage that it will, by the action of the inclined surface of the knife at one end of said bar E', be moved away from the stationary bar E to some extent throughout its entire length, with the exception of its extreme end remote from that which is acted upon by the movable cutter. Another construction of the bar, in which such bodily movement of the latter will be absent, is illustrated in Figs. 12 and 13, in which the bar is shown as made in several separate and separately-movable parts or sections, E^4, which are each held in position adjacent to the stationary bar by spiral springs E^5, and moved away from the said stationary bar one after another in the advance movement of the inclined knife.

In Fig. 12 the parts or sections E^4 are shown as entirely independent of each other and as having rounded ends, whereby they may be moved into an inclined position without being shifted endwise by their contact with adjacent sections.

In Fig. 13 the parts or sections E^4 are shown as pivotally connected at their ends, thus forming a flexible bar or table-section, the parts of which will be thrust outwardly in the downward movement of the knife in the same manner as the entirely independent parts shown in Fig. 12, with the exception that the end of each section toward which the knife edge is advancing will in the construction shown in Fig. 13 be moved outward slightly before it is reached by the knife by the outward movement of the section already engaged by the knife.

In the forms of the device shown both in Figs. 12 and 13 the sections E^4 will preferably be held slightly forward of the plane in which moves the edge of the movable cutter by means of suitable stops, which may be similar to the stops *e*, (illustrated in Fig. 3,) as indicated in dotted lines in said Figs. 12 and 13.

In the use of a movable knife or cutter which is considerably inclined it is obvious that when a single or rigid movable table-section or bar, E', is employed the end thereof engaged by the advance part of the movable knife, will be moved outward a considerable distance at the time that the knife is brought down sufficiently to cut at the middle part of the table—as, for instance, if by the action of the inclined surface at one end of the knife the end of the said bar or table-section is moved outwardly half an inch when the knife has descended sufficiently to bring its cutting-edge half above and half below the level of the top of the table, the bar at its middle portion, or that at which the knife is operating, will at such time be one-fourth of an inch from the knife-edge. By making the said movable bar or table-section flexible, or in parts, as shown in Figs. 12 and 13, however, the several sections E^4 will be moved outwardly only as they are reached by the knife, and to a very slight extent only in advance of the point at which the knife is cutting. This operation is illustrated in Fig. 12, in which is shown a dotted line, $e^2\,e^2$, representing the line of intersection between the plane of the table and the oblique or beveled surface of the movable knife, the sections E^4 being shown with their edges upon the said line, this being the position which they will take when partially thrust outward by their contact with the said inclined or beveled surface of the movable knife.

The knife C is arranged and operated with reference to the bar E so as to make a combined draw and shear cut, the said knife C being inclined so that its cutting-edge is at an angle with the table, and actuated by devices giving to it a well-known compound motion, involving both a vertical and an end or longitudinal movement. The end or longitudinal movement of the knife is preferably made in the direction of or toward the lower advance

end thereof, for reasons which will hereinafter appear.

An important advantage obtained by the use of an inclined knife having an oblique movement is that the lower sheets of the pile of paper resting upon the table may be more cleanly and readily cut, for the reason that the knife, instead of pressing directly downward, and thereby tending to bend or fold the paper downwardly between the knife and the bar E, will cut the sheets transversely, beginning at one edge, so that the pressure thereon is sidewise, or upon the edge being cut, as well as downwardly; and the knife being moved edgewise as well as downwardly, a clean and smooth cut will always result.

By the use of a knife constructed and operating as described, also, I am enabled to set the stationary knife with its cutting-edge laterally separated from the bar E, or in such manner that the knife will move past the said bar without actual contact with the latter, as before mentioned. This construction is rendered possible in the use of an obliquely-moving inclined knife, for the reason that the said knife has relatively little tendency to depress the edges of the lower sheets of the pile in cutting, for reasons before set forth. By separating the knife from the bar E, as described, the important advantage is obtained of avoiding liability of dulling the knife, and the consequent necessity for frequent sharpening of the same, which is liable to occur when the knife and the said bar are in contact.

An important advantage is obviously gained by the employment of the movable table section or bar E′ when the knife C is slightly separated from the bar E and the said knife is inclined and obliquely moved, as described, for the reason that said movable bar E′, together with the bar E, affords a support for the paper at both sides of the knife, so that the lower sheets may be more readily and cleanly cut and the paper held from lateral movement under the action of the knife with little or no assistance from a clamp, as hereinbefore fully set forth.

The inclination of the knife C with reference to the table may be obtained either by attaching the said knife C at an angle with the bar D, by which it is supported, or by supporting the said bar in an inclined position. The inclination of the knife C also may be adjusted either by moving it upon the bar D or by adjusting the said bar bodily. As herein shown, the knife is set at an angle with the bar D, and the latter is adjustably supported at its ends, whereby the angle of the knife may be readily adjusted without shifting it upon the bar.

As illustrated in the drawings, the knife-bar is connected with the top of the frame by one or more links or toggles, F, which serve to effect its longitudinal motion, and said bar is sustained at its ends from two oscillatory levers, H, pivoted upon the sides of the machine-frame by means of two connecting-rods, G, adjustably united at one or both ends with socket-pieces, G′, which are in turn connected by ball-and-socket joints G^3, or other suitable forms of universal joints, with the forward ends of the oscillatory levers H and the ends of the knife-bar.

The connecting-rods, as a simple and desirable construction, are, as herein shown, provided with oppositely-inclined screw-threads at their ends, which are engaged with the interiorly-threaded socket-pieces, so that by turning either or both of the rods the ends of the knife-bar can be raised and lowered as desired. The ball-and-socket or other universal joints permit the arms or pitmen G to swing freely, so as to accommodate themselves to the end motions of the knife-bar during the rise and descent of the latter. The oscillatory levers H are pivoted at the sides of the machine, as at H′, and receive their oscillatory motion from large gear-wheels, H^2, arranged at the sides of the machine, and provided with suitable studs extending into the grooves in the rear end portions of the oscillatory levers, as illustrated in dotted lines in Fig. 2. The gear-wheels are mounted on a horizontal shaft, *h*, extending transversely through the rear portion of the main frame, and are separately engaged by pinions I, fixed upon a horizontal shaft, I′, which is provided with a pulley, I^2, over which the driving-belt for communicating power to the machine is placed. A clutch mechanism is herein shown for connecting the said pulley with the shaft, which embodies features of improvement, and which will be hereinafter described.

As an improved construction in the bed or table B, the latter, as clearly shown in Figs. 1, 3, and 11, is made in two parts, B^3 and B^2, and is provided with a slot or opening formed along the line of juncture between the parts B^3 and B^2 and beneath the edge of the bar E. The parts of the table are preferably united by means of depending lugs b' b^2 upon the parts B^3 and B^2, respectively, through which lugs are inserted suitable bolts, b^3, for holding the parts together.

By making the table in two parts, as shown, the obvious advantage is obtained that the recesses therein for the stationary bar E and the bar E′ and the sides of the slot *b* may be readily and accurately planed out and finished. In the particular construction of the parts illustrated in the drawings the rear edge of the bar E and the rear wall of the recess in the table for said bar E are inclined relatively to the front edge of the bar E, and the latter is made longitudinally movable and provided at its smaller end with a stem, e^3, extending through the side frame of the machine, and provided with a nut upon its exterior end, whereby the said bar E may be moved longitudinally and its front edge thereby adjusted laterally with reference to the movable knife, as desired.

The clutch devices above referred to for connecting the pulley I^2 with and disconnecting

it from the shaft I′, upon which said pulley is constructed to run loosely, are as follows: A collar or sleeve, L, is fixed upon the shaft I′ adjacent to the pulley I^2, and is provided with a recess or notch, L′, in its end nearest the pulley, said notch preferably being arranged to extend about half-way around the shaft. A horizontally-sliding dog, N, upon the pulley-hub is adapted to engage the said notch when thrown outwardly, said dog being actuated by a spring, N′, which tends to hold the dog in position for engagement with the notch L′.

M is a sliding spring-latch, which is, as herein shown, located radially upon the hub and thrown inwardly toward the dog N by means of a spring, M′, and is provided at its end adjacent to the dog with a projection, *m*, adapted to engage a notch, *n*, in one side of the said dog, whereby the said latch is adapted to automatically lock and hold the latter in its retracted position and free from the collar L. The said dog is moved, in order to relieve it from the notch L′, by means of a movable cam plate or block, O, which is provided with a transversely-inclined cam-face, *o*, adapted to engage the end of the dog in the rotary movement of the pulley, and operating to throw the dog backwardly, so as to free it from the notch L′. The said cam-plate is also provided with an inclined or cam face, *o′*, constructed to engage a projection, *m′*, upon the latch M, so as to move the said latch against its spring and to free the dog when the latter is held in its retracted position by the engagement of the projection *m* of the latch with the notch *n* of the dog. The dog N is, as herein shown, Fig. 10, provided at its outer end with a diagonal shoulder, *n′*, for engagement with the incline *o* of the cam-plate; but said shoulder is obviously not essential.

The cam-plate O is carried upon the end of a sliding rod, P, which is arranged radially with reference to the shaft I′, and which is connected with and actuated by a hand-lever, P′, adapted to move the rod longitudinally, and to thereby bring the cam-plate nearer to or farther from the axis of the shaft.

The surface *n′* of the dog N and the projection *m′* of the latch M are so arranged with reference to the inclined or cam faces of the cam-plate O that the dog is moved inwardly when the said cam-plate is at the upper or inner limit of its movement, and the latch will be moved so as to release the dog when the cam-plate is moved outwardly, the parts being so constructed that when the incline *o* of the cam-plate is in position to engage the dog the projection *m′* will pass the plate without touching it, and when the plate is moved outwardly to engage the said latch the dog will move freely past the plate. When the dog is retracted and the pulley is running loose upon the shaft, the machine is started, therefore, by an outward or downward movement of the cam-plate to bring the inclined surface *o′* thereof into the path of the projection *m′*, whereby the dog will be disengaged and will be thrown outwardly into engagement with the notch L′. In order to stop the machine, a reverse movement of the cam-plate will obviously cause the engagement of the incline *o* thereon with the dog, whereby the latter will be thrown out of the notch L′ and the pulley disengaged from the shaft.

The slide-rod P, which carries the cam-plate, is supported by arms *p*, secured to one side of the frame of the machine and provided with suitable bearings for said rod.

The lever P′ is pivoted at *p′* to the frame, and has its handle end extended out at the front of the machine, so that it can be conveniently grasped by the person operating the machine.

In order to provide a means for operating the clutch so as to stop the machine automatically after each descent and ascent of the knife, as well as for stopping the machine by hand at any moment desired, the lever P′ is provided with a depending arm, P^2, located with its lower end over one of the oscillatory levers H and in such position that it will be encountered by the said lever in the upward movement thereof, the parts being so arranged that when the said lever reaches the upper limit of its movement and is in position to sustain the knife-bar at the highest point the lever P′ will have been raised by the oscillatory lever so as to bring the cam-plate into the path of the dog, and thereby cause the disengagement of the latter from the collar L and a consequent stoppage of the machine.

The arm P^2 is preferably pivoted at its upper end to the inner end or arm of the lever P′, and is connected by a rod, P^3, with a thumb or latch lever, P^4, which is pivoted to the lever P′ at the handle end thereof, so that either or both of said levers can be conveniently grasped and controlled by the operator. The object of this latter construction is to enable the lower end of the arm P^2 to be lifted, and to thereby prevent the operation of the lever H upon said arm when it is desired to run the machine continually without stopping at the end of each reciprocating movement of the knife.

The machine is started by raising the outer arm of the lever P′, so as to depress the inner arm thereof, and thereby bring the cam-face *o′* of the block in the path of the stud or projection *m′* on the latch, and the machine will continue to run until the cutter has descended and is again lifted, when the lever will be moved by the action of the lever H upon the arm P^2 and the machine stopped. If the lever is depressed, also, after it has been raised to start the machine, the clutch will in the same manner become disengaged at the end of the next upward movement of the cutter. By grasping the thumb-lever P^4, however, and drawing it toward the handle of the lever P′, the arm P^2 will be raised to free it from the forward end of the oscillatory lever H, whereby the operation of the machine may be made continuous as long as may be desired.

The shaft I′, upon which the belt-pulley is

mounted, is preferably provided, at a point exterior to the latter, with a hand-wheel, Q, rigid with the shaft. The purpose of this hand-wheel is to enable the shaft to be turned for the purpose of moving the cutter by hand. Said wheel is also useful to enable the collar L to be turned so as to bring the notch L′ opposite the cam-plate *o*, in order to allow the dog to enter said notch when released by the cam-plate. When the collar is turned so as to bring its part which is opposite the recess L′ adjacent to the cam-plate, the dog will obviously be held from movement when the latch is disengaged from the cam-plate, so that by turning the shaft so as to bring the collar into the position last mentioned the clutch will be prevented from operating, and a safety device is thus provided to prevent an accidental starting of the machine, as might occur by the lever P′ being unintentionally moved.

The sleeve L is herein shown as provided with a collar or flange, L^2, in contact with which the edge of the cam-plate O is arranged to run, said flange serving as an abutment to prevent lateral movement of the said cam-plate in the action of the dog N upon the incline *o* of the cam-plate, whereby lateral strain upon the rod P and the consequent frictional resistance to the movement of the rod in its bearings and wear in the parts are prevented.

The machine shown has a clamp, R, operated from a spindle, S, having at one end a hand-wheel, S′, and at the other a worm, S^2, Fig. 2, engaging a gear, R′, on a shaft, which may be provided with pinions engaging sliding racks attached to and supporting the clamp. This clamping device is of a form well known, and need not be more particularly described.

A suitable paper gage, T, is herein shown, said gage being operated by means of a hand-wheel, T′, and a sprocket-chain, T^2, in a well-known manner.

I claim as my invention—

1. In a paper-cutting machine, the combination, with a movable cutter, of a bed or table, a laterally-movable bar, E′, located in front of the cutter and supported and constructed to slide upon the said table, and a spring applied to throw the said movable section of the table toward the cutter, substantially as and for the purpose set forth.

2. In a paper-cutting machine, the combination, with a movable knife or cutter and a table provided with an opposing stationary part or edge, of a laterally-movable bar, E′, a spring applied to throw the said bar E′ toward the stationary part of the table, and stops adapted to hold the said movable part or bar from contact with the stationary part of the table, substantially as described.

3. In a paper-cutting machine, the combination, with a movable knife or cutter, of a table comprising a laterally-yielding part or bar, E′, made in several separately-movable parts or sections, substantially as described.

4. In a paper-cutting machine, the combination, with a movable cutter, of a table made in two stationary parts, B^3 and B^2, separated to form a slot, *b*, at the line of junction between the parts of the table, and provided with lugs b' b^2, bolted together, for uniting the parts, substantially as described.

5. The combination, with the oscillating lever H, for actuating the knife, and a clutch device connecting the driving-pulley with the driving-shaft of the machine, and comprising a dog, N, and a latch, M, of a cam-plate, O, adapted to operate said dog and latch, a sliding rod, P, supporting said cam-plate, a hand-lever, P′, pivoted upon the machine-frame and connected with the said rod, an arm, P^2, pivoted upon the said lever, with its free end in the path of the oscillating lever H, a latch, P^4, pivoted upon the lever P′ adjacent to its handle, and a rod, P^3, connecting said arm P^2 and latch P^4, substantially as described.

6. The combination, with the driving-shaft I′ and the pulley I^2, and a clutch device for connecting said pulley and shaft, embracing a collar or sleeve, L, upon the shaft, provided with a notch or recess, L′, and a movable dog, N, upon the pulley, constructed to engage said recess L′, and a cam-plate, O, for actuating said dog, of a hand-wheel, Q, upon the driving-shaft, whereby the latter may be turned into position to prevent the engagement of the dog with the recess when said dog is released by the action of the cam-plate, substantially as described.

In testimony that I claim the foregoing as my invention I affix my signature in presence of two witnesses.

EDWARD P. DONNELL.

Witnesses:
C. CLARENCE POOLE,
OLIVER E. PAGIN.