(No Model.) 2 Sheets—Sheet 1.

C. SEYBOLD.

PAPER CUTTING MACHINE.

No. 464,202. Patented Dec. 1, 1891.

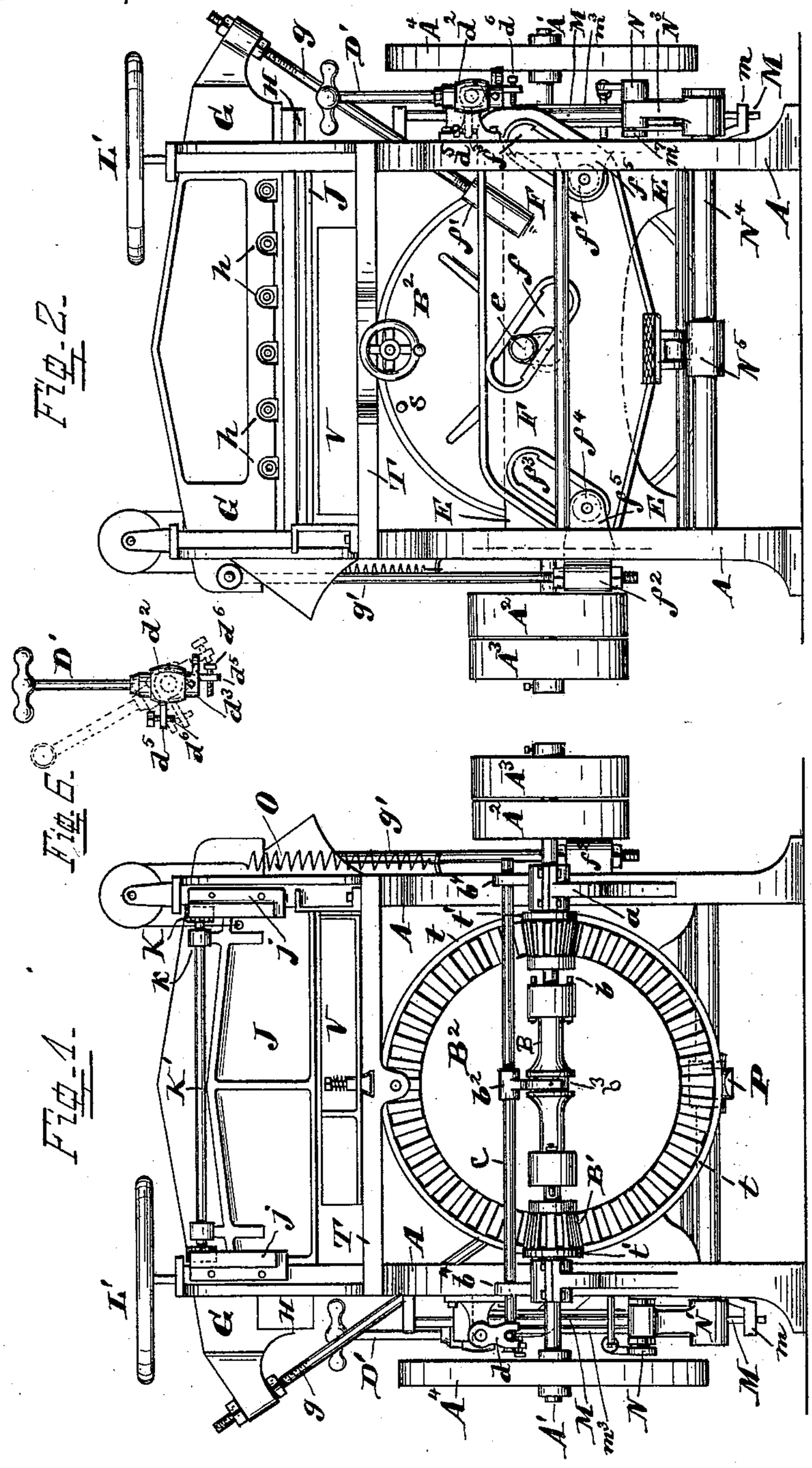

Fig. 2.

Fig. 5.

Fig. 1.

Fig. 7.

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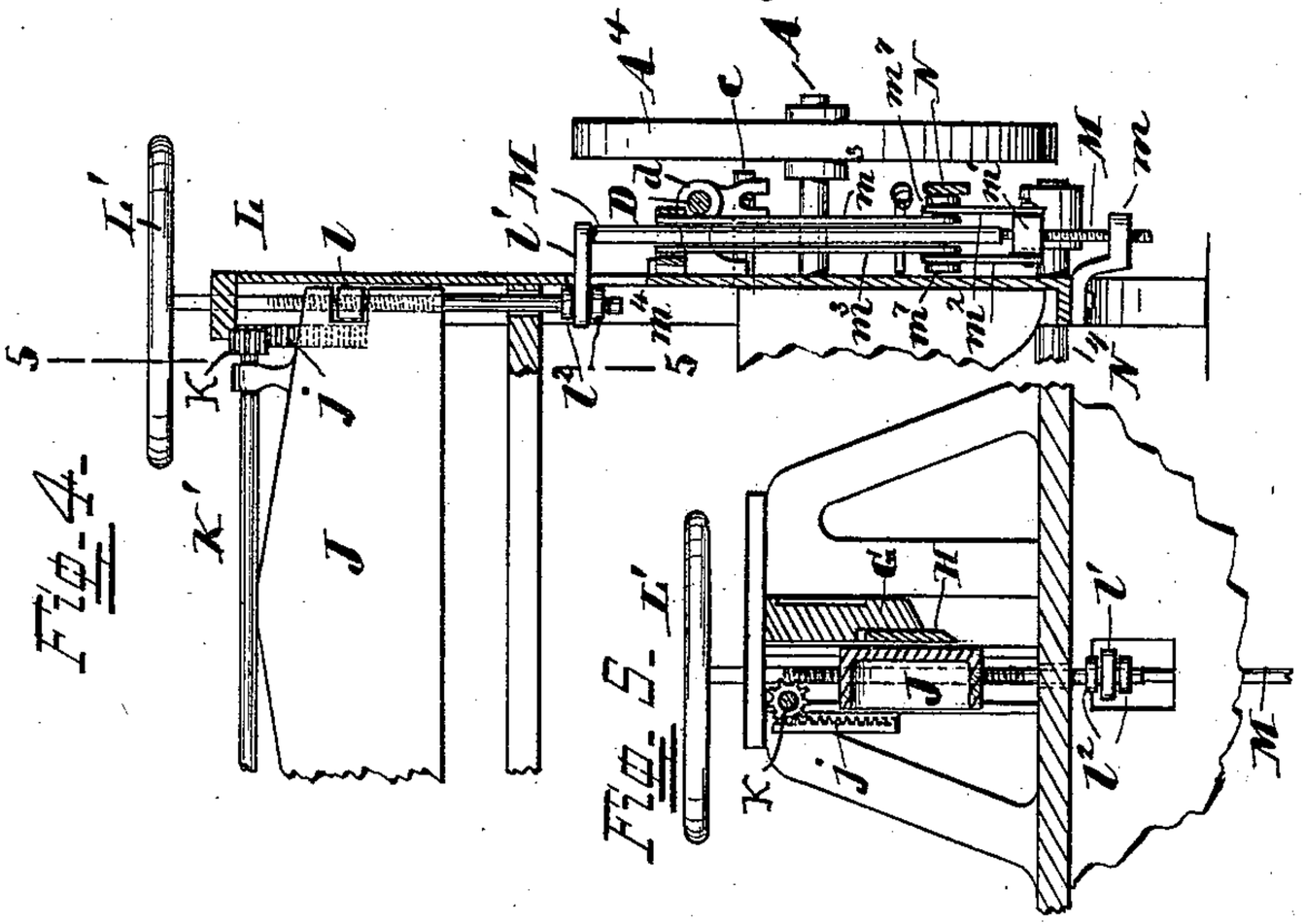

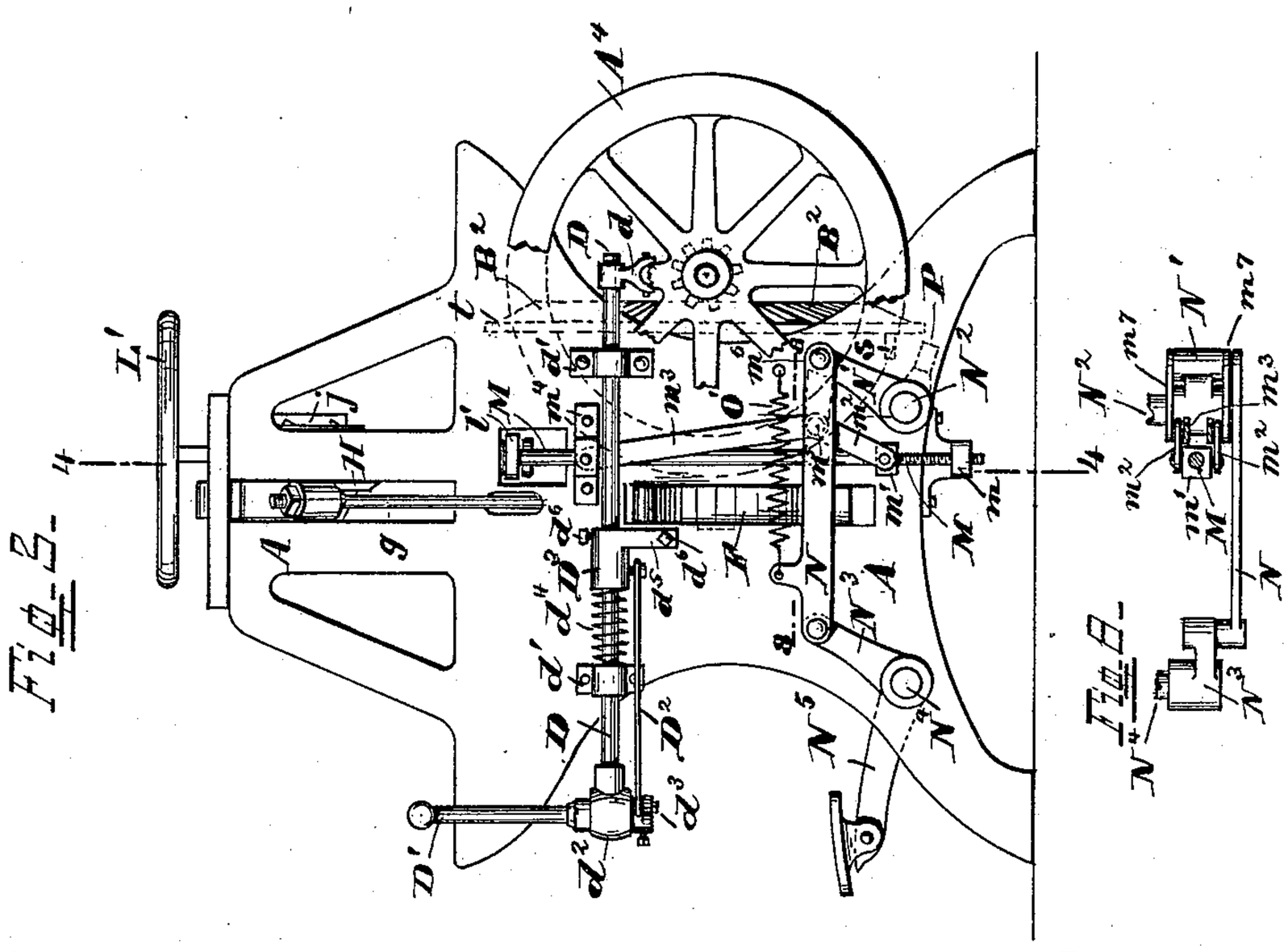

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UNITED STATES PATENT OFFICE.

CHARLES SEYBOLD, OF CINCINNATI, OHIO.

PAPER-CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 464,202, dated December 1, 1891.

Application filed February 16, 1891. Serial No. 381,640. (No model.)

To all whom it may concern:

Be it known that I, CHARLES SEYBOLD, a citizen of the United States, residing at Cincinnati, Hamilton county, and State of Ohio, have invented certain new and useful Improvements in Paper-Cutting Machines, of which the following is a specification, reference being had to the accompanying drawings, in which similar letters of reference refer to corresponding parts of the mechanism throughout.

The object of my invention is to construct a machine for cutting paper which shall be more simple of construction and at the same time more effective and reliable in operation than those now commonly used, and one that cannot easily get out of order.

My object is also to combine in one machine all the advantages of a hand-clamp and a power-clamp, the latter being especially valuable when desired to trim a number of bundles of uniform thickness, or even when desired to trim more than one face of the same bundle, as will hereinafter appear.

In the accompanying drawings, Figure 1 is a rear elevation of my improved machine in a non-operative position with the knife and clamp-bar elevated, and Fig. 2 is a front elevation of the machine shown in Fig. 1. Fig. 3 is a side elevation taken at the right hand in Fig. 2, a portion of the balance-wheel being broken away to more clearly show certain mechanism for slightly lowering and locking the clamp-bar by means of a foot-treadle after the requisite degree of pressure is once determined by means of the hand-screw. Fig. 4 is a section on the line 4 4 of Fig. 3, showing the position of the preferred mechanism for operating the clamp-bar either as a hand-clamp or a power-clamp, as may be desired. Fig. 5 is a section taken at the line 5 5 of Fig. 4, showing the relative position of the clamp-bar, knife, and knife-head, and also the toothed rack and pinion for guiding and equalizing the pressure on both ends of the clamp-bar alike. Fig. 6 is a detached view of the lever and its connecting mechanism for starting and automatically stopping the machine after the knife has made its cut and ascended, the solid lines indicating the position of said parts when the machine is in a non-operative position and the dotted lines the position of said parts while the machine is in operation making a cut. Fig. 7 is a longitudinal section through one end of the clutch, showing the preferred mode of connecting the spring-actuating pins therein to engage with suitable openings in the hub of the adjacent pinion. Fig. 8 is a top view of the horizontal bars for operating and locking the toggle-bars in a vertical position, said view being taken on the line 8 8 of Fig. 3.

The preferred construction of my improved cutting-machine is that shown and is as follows: Suitable end frames A uphold and support the operating mechanism, to which frames are connected suitable bearings *a* for the driving-shaft A′, as more clearly shown in Fig. 1, to which shaft are connected the usual tight and loose pulleys A^2 A^3 and balance-wheel A^4.

To the main shaft A′ is connected the clutch B, the connection being what is known as a "feather-and-groove" connection, by means of which said clutch may freely slide longitudinally on said shaft, but must necessarily rotate therewith. In the enlarged end portions of this clutch are secured the connecting-pins *b*, (one pin would answer the purpose, but it is preferred to use two,) which pins extend through the enlarged portions of said clutch and are secured therein by a nut at rear and a coiled spring within said head, as shown in Fig. 7, the spring tending to retain the end of said pins out beyond the face of the clutch. The purpose of these spring-actuating pins in the clutch is to engage with corresponding openings (not shown) in the hub of pinions B′ and impart motion thereto and dispense with the usual noise and confusion attendant upon the use of the old forms of clutch mechanism. The pinions B′ are loosely connected to the main driving-shaft and mesh with the driving-gear B^2, as shown. The clutch has a central annular recess b^3, in which the bifurcated portion of lug b^2 rests, said lug being rigidly connected to the sliding rod C, which latter is supported by suitable brackets b^4 on a line parallel with the driving-shaft. To one end of this rod C is a pin or pins, which rest between the bifurcated portions of lug *d*, the latter being rigidly connected to the auxiliary shaft D, as shown in Figs. 1, 3, and 4. This shaft D is

supported by bracket-bearings d', connected to the end frame, (see Fig. 3,) said shaft having at its outer end a socket d^2, rigidly connected thereto, through which the lower vertical portion of handle D′ projects, and is secured therein in a rotatable position.

To the lower end of handle D′, and beneath the socket d^2, is secured a set-collar d^3, to which is pivoted one end of bar D^2, the opposite end of said bar being pivoted to an extension of the stop-lug D^3, the latter being connected to shaft D by a feather-and-groove connection, (not shown,) by means of which said lug may slide thereon, but must rotate therewith. Between one end of this stop-lug and the bracket-bearing d' is interposed a coiled spring d^4 or equivalent thereof, as shown in Fig. 3. This stop-lug has lateral projections d^5, in which are preferably secured suitable set-bolts d^6, as more clearly shown in Fig. 6.

I will now describe the operation of the mechanism just delineated, which constitutes the starting and driving mechanism. The operator grasps the handle D′ and gives it a slight twist, which movement, through the medium of bar D^2, causes the stop-lug D^3 to slide forward on the shaft, so that the projection d^5 and bolts d^6 will be drawn away from the outer end of the driving-bar F, as shown in Fig. 3, in which position said lug and its shaft are free to be rotated a partial revolution. The operator now vibrates the handle to the left, as shown by dotted lines in Fig. 6, which movement is imparted to shaft D and its outer bifurcated lug d, which latter in turn causes the rod C to slide to the left in Fig. 1, and with it the clutch is made to engage with the pinion at left hand in said figure and impart a rotary motion thereto, which movement is transmitted to the main driving-gear B^2. A reverse vibratory movement of the handle causes a reverse movement of the clutch, and necessarily a reverse movement of the driving-gear and knife, as will presently appear. This reverse movement may be accomplished at any stage of the cutting process and in a moment's time, so that if the operator should not have properly gaged his work the knife may be stopped immediately and reversed in its movement. The main driving-gear B^2 is journaled in a suitable bearing in the cross-frame E, (see Fig. 2,) said journal having a crank-extension e, the horizontal portion of said crank projecting through an oblique opening f in the driving-bar F, said portion of the crank being preferably provided with a roller to bear and rotate against the inner elongated faces of said opening as the crank is rotated. The driving-bar F is connected to the knife-bed G by means of the connecting-rods g and g', the rod g being secured at one end in the socket f', cast with the bar F, and at its other end adjustably connected to the extension of the knife-head, preferably as shown, with set-nuts above and below said extension. The rod g' is connected at its upper end to the end of the knife-head and at its lower end adjustably connected in the projection f^2, cast with the bar F, by means of the set-nuts above and below said projection, as clearly shown in Fig. 2. The purpose of this connection between the driving-bar F and knife-head G is to secure a reliable and accurate means for adjusting the knife in its downstroke, and also to afford a strong connection between said parts to prevent torsion. The lower edge of this knife-head G is provided with the knife H, which latter is secured within the rabbeted portion of said head by means of suitable set-screws h.

The driving-plate F is provided near each end thereof with the elongated openings f^3, in which are rollers f^4, the latter being journaled in suitable brackets f^5, made fast to the end frames in any suitable manner, as shown in Fig. 2. These rollers are for the purpose and serve as a guide and a support for the driving-plate in its up-and-down angular movement.

I will now describe the operation of this latter mechanism for operating the knife, which is as follows: Motion being imparted to the main driving-gear B^2 in the manner aforedescribed, said rotary movement of the gear, through the medium of its central crank e, imparts an up-and-down angular movement to the driving-bar F, which latter movement is imparted to the knife-head and its knife through the medium of rods g and g'. As aforestated, the operator on starting the machine draws the stop-lug D^3 away from the face of the driving-bar F, and then vibrates the handle. So soon as the driving-bar and knife begin to descend the operator releases his hold on the handle, at which time the stop-lug is forced back in position by the spring d^4, but in a tilted position, as indicated by dotted lines in Fig. 6, and as the driving-bar F ascends through the slot in the end frame it strikes the set-bolt b^6, which is tilted forward, forcing it upward and backward, and with it said shaft D is partially rotated, which causes the clutch to be drawn away from its driving-pinion in the manner aforedescribed. It will thus be seen that the upstroke of the driving-bar, coming in contact with the stop-lug D^3, stops the operation of the machine automatically. One revolution of the main driving-gear is sufficient to lower and elevate the knife and automatically stop its motion.

Having described the preferred form of mechanism for operating the knife-head and its knife and its operation, I will now describe the preferable form clamp-bar and its operating mechanism for putting pressure on the bundle of paper before being trimmed. The clamp-bar J is mounted between the end frames A at its end portions, and also between the knife-head and vertical brackets j, secured to the end frames, the inner flanged face of said brackets having teeth, as shown

in Figs. 4 and 5. To the clamp-bars are secured suitable bearings *k*, in which the rod K′ rests and rotates, the outer ends of said rod having suitable pinions K keyed thereto, which pinions mesh with the teeth in brackets *j*, as shown. As said bar is moved up and down in the manner presently to be described said pinions travel on the teeth of brackets *j*, and, said pinions being keyed to the rod K′ and of equal size, both ends of said clamp-bar must travel up and down simultaneously and at the same rate of speed and pressure. In one end of this clamp-bar J is a recessed portion, (shown at right hand in Fig. 4,) in which is placed a loose nut *l*, which latter has a central screw-threaded opening through which the screw-rod L passes, the latter at its top portion having a suitable hand-wheel L′, the latter to be used to apply pressure to the bundle, and also, when desired, to operate the clamp by hand exclusively, as will presently appear. The lower end of this rod L passes through a horizontal connecting-piece *l′*, which latter projects through an opening in the end frame, said screw-rod being securely connected to said piece in a rotatable position by means of the set-collars l^2, as shown in Figs. 4 and 5. To the outer end of piece *l′* is rigidly connected one end of the vertical rod M, the lower end of which passes loosely through the guide *m*, as shown in Figs. 3 and 4. On the lower screw-threaded portion of rod M is screwed the set-nut *m′*, to which latter is pivoted one end of the short bars m^2, the opposite ends of said bars being pivoted on the bolt m^5, to which bolt are also pivoted the lower ends of the long bars m^3, the opposite ends of said latter bars being pivoted to a stationary bracket m^4 on the frame of the machine, as shown in Figs. 3 and 4. The rear end of the bar N is pivotally connected to the lever N′, the lower end portion of which is rigidly connected to one end of the rear cross-shaft N^2, the latter being suitably journaled in the end frames. (See Fig. 4.) The front end of this rock-bar N is pivotally connected to the top of lever N^3, which latter at its opposite end is rigidly connected to one end of the front cross-shaft N^4, which latter is centrally provided with a foot-treadle N^5, said latter shaft being suitably journaled in the end frames.

Between the pivotal points m^5 and m^6 are connected the short horizontal bars m^7, as more clearly shown in Fig. 8, to assist in operating the vertical toggle-bars m^2 and m^3.

I will now describe the operation of the mechanism last described for operating the clamp-bar either as a hand-clamp or as a power-clamp. It will be observed that the screw-rod L and rod M, by reason of the connection *l′*, constitute a continuous rod from the hand-wheel to the guide *m*, the screw-rod being rotatable, while the rod M is not. When desired to operate the clamp by hand only, the foot-treadle and compound toggle-bars and connecting mechanism just described are not used, the operator simply turning the hand-wheel L′ in the desired direction, which movement causes the nut *l* to travel up or down on the screw-rod and carrying with it the clamp-bar. The pinions K on shaft K′ (which latter operates in bearings on the clamp) serve to bring both ends of said clamp down equally and with equal pressure.

It is quite evident that when used as a hand-clamp the latter must be set and released by means of the hand-wheel every time a cut is made, and in order to do away with this inconvenience and loss of time in setting the pressure every time a cut is made I have provided the means aforedescribed, which operates as follows: The toggle-bars m^2 and m^3 are sufficiently out of a vertical line when in their normal position, as shown in Fig. 3, so that when brought into a vertical line and locked they will cause the rod M, screw-rod L, and clamp J to be lowered about one inch and locked in that position by means of said toggle-bars. This lowering of the clamp, screw-rod, and rod, and also the locking of said toggle-bars, is accomplished through the medium of bar N, lever N^3, and shaft N^4 by putting pressure on the foot-treadle N^5. Said parts are unlocked automatically in the manner presently to be described. After having put his foot on the treadle and caused said clamp-bar to descend and become locked in the manner aforedescribed, the operator now takes hold of the hand-wheel L′ and turns it in the proper direction until the bundle to be trimmed is sufficiently and properly pressed, which pressure serves as a guide for all subsequent bundles of equal thickness to be trimmed, also for the same bundle if desired to trim more than one side thereof. After having made one cut the clamp-bar is unlocked automatically (as will presently appear) and elevated about one inch through the medium of springs O and O′ or their equivalent, the spring O being sufficiently strong to elevate the clamp-bar and the spring O′ strong enough to bring the toggle-locking bars back into their normal position, as shown in Fig. 3. It will thus be seen that the hand-wheel and its screw-rod have not been disturbed, only slightly elevated together, and the one-inch space is sufficient to remove the bundle and place another bundle of equal thickness beneath the clamp-bar. Having placed another or the same bundle beneath the clamp, all the operator has to do is simply to put pressure on the treadle, which will bring the clamp-bar down the one inch previously elevated and cause exactly the same pressure as was originally applied by the hand-wheel, the latter not having been changed. Any number of bundles of equal thickness may thus be trimmed at a uniform pressure without touching the hand-wheel, thus saving much valuable time, as the clamp-bar is unlocked and elevated automatically in the manner now to be described. On the rear cross-shaft N^2, to which the lever N′ is keyed, is centrally connected a beveled

projection P. To the inner face of gear B^2 is connected a lug S, said projection and lug being shown by dotted lines in Fig. 3. This lug S is so located on the gear that so soon as the knife has descended and made its cut this lug will come in contact with the beveled face of projection P on shaft N^2, forcing said projection downward, and with it the shaft is slightly rotated rearward, and said rotation of said shaft, through the medium of lever N′ and bar N, causes the pivotal point of the toggle-bars m^2 m^3 to be drawn backward and unlocked. The toggle-bars having been unlocked automatically in the manner just described, the springs O and O′ will elevate the clamp-bar ready to be again lowered and locked by means of the foot-treadle in the manner aforedescribed. It will thus be seen that the clamp employed in my improved paper-cutting machine may be manipulated either as a hand-clamp or as a positive power-clamp, which latter is operated by simply pressing the foot-treadle after having once set the hand-screw and clamp to the desired pressure. This is a very valuable feature of my invention and one that will at once commend the machine to the trade.

One great drawback and disadvantage heretofore experienced in operating a cutting-machine with geared power has been the fact that said gears are liable to become forced out of line with each other and cause the teeth of said gears to break. To overcome this very objectionable feature, I have arranged the gear-operating mechanism of my improved machine as follows: On the face of main gear B^2, between its teeth and outer peripheral edge, is a smooth annular surface *t*, against which the smooth annular surface *t′* on the hub of pinions B′ rotates when in motion. The pinions B′ being on the same driving-shaft, any tendency of the main gear to spring from place at one side is immediately counteracted and met by the smooth annular surfaces *t* and *t′* on the opposite side of the main gear and opposing pinion, and in this manner the teeth of the main gear and pinions are always kept properly in line with each other and the danger of breaking same is obviated.

My improved cutting-machine is provided on its table T with a suitable gage V, which latter may be of any desired construction to properly gage the work to be cut.

While it is preferred to employ all the several features of invention herein enumerated in the connection shown and set forth, it is evident that one or more of said features might be used in machines otherwise differently constructed without departing from my invention.

Having described the operation of the mechanism for starting and stopping the machine for operating the knife and clamp-bar in connection with the detailed construction of same, I will now briefly describe the operation of the machine as a whole: The operator places the bundle to be trimmed on the table beneath the clamp-bar, and, if desired to operate the latter as a hand-clamp only, the hand-wheel is turned to lower and raise the clamp at each cut. If desired to operate said bar as a power-clamp, the operator first lowers and locks said bar by means of the foot-treadle, as set forth, the drop being about one inch, as aforestated, after which he turns the hand-wheel L′ until sufficient pressure on the bundle of paper is secured. To start the machine and knife, the operator turns the handle D′, drawing the stop-lug D^3 away from the end of lifting-bar F, as shown in Fig. 3, at which time he pulls said handle inward, as shown by dotted lines in Fig. 6, which operation causes the clutch to engage with one of the pinions and start the machine in the manner aforedescribed. After the machine is started and the lifting-bar F has begun to descend the operator releases his grasp on the handle, at which time the stop-lug D^3 is forced back by spring d^4 in position to be struck by the end of said bar in its upstroke, as aforestated, and automatically stop the operation of the machine. The clamp-bar J is released or unlocked automatically (when used as a power-clamp) by reason of the lug S coming in contact with the beveled face of projection P, as fully set forth hereinbefore, which operation is accomplished while the knife is on its upstroke.

The advantages of my improved paper-cutting machine are apparent, combining, as it does, all the advantages of a hand or power clamp, and at the same time avoiding the objectionable features found in those now commonly in use separably in separate machines.

The crank-movement connected to the driving-gear for elevating and depressing the lifting-bar and the connection between said bar and the knife-head are valuable features of my invention, securing, as they do, a powerful movement, and this without any considerable strain on the main gear, as the circle described by the crank is much less than that of the outer surface of said gear.

The means employed for automatically stopping the machine, as is also the means for locking and automatically unlocking the clamp-bar, are valuable features, as is also the means employed for keeping the teeth of the pinions in line with the teeth on the main gear.

The toggle locking bars for lowering the screw-rod and clamp-bar a given distance, in connection with the automatic mechanism for unlocking and elevating said parts an equal distance, which movements are effected without disturbing the pressure originally applied by means of the hand-wheels, are certainly very valuable features to save time and annoyance.

The means afforded for reversing the movement of the knife in a moment's time is an-

other valuable feature, as said reverse movement may be accomplished at any stage of the cutting process.

The machine as a whole is very simple of construction, easily taken down and put together again, and cannot easily get out of order, as do the cutting-machines now in general use.

What I claim as new, and desire to secure by Letters Patent, is—

1. In a paper-cutting machine, a knife mounted on a vertically-movable head, the latter being adjustably connected to a driving-bar, said bar having a central oblique opening and a guide-opening near each end thereof, in combination with a driving-gear provided with a crank resting in said central opening of said driving-bar, and guide-rollers suitably connected to the end frames and resting in the end openings of said bar, and suitable means for rotating said driving-gear, substantially as set forth.

2. In a paper-cutting machine having a knife operated by a driving-bar and connecting mechanism, as set forth, the means herein set forth for automatically stopping said machine, the same consisting of a stop-lug D^3, mounted on shaft D, the latter having a connection with the clutch, said stop-lug having a lateral projection against which the end of said driving-bar strikes on its upstroke, as set forth.

3. In a paper-cutting machine, a vertically-movable clamp-bar mounted between the knife-head and toothed bracket at each end thereof, said clamp-bar having a recess in one end thereof, in which is a loose nut, with a screw-rod passing through and operating in said nut, said clamp-bar having stationary bearings, through which is a shaft, the latter having a pinion keyed to each end thereof, which pinions mesh with the teeth on the vertical brackets, and suitable means for operating said screw-rod, for the purposes specified.

4. A paper-cutting machine having a clamp-bar mounted and connected thereto, substantially as set forth, with a hand-screw for applying pressure thereto, in combination with suitable means for lowering said clamp-bar and screw-rod a given distance and locking same, and means for unlocking and elevating said parts, for the purposes herein set forth.

5. A paper-cutting machine having a clamp-bar mounted and connected thereto, substantially as set forth, with a hand-screw for applying pressure thereto, in combination with extension l', collars l^2, rod M, having a set-nut m' near its lower end, toggle-bars m^2 and m^3, and horizontal bar N, said toggle-bars m^2 being pivotally connected to said nut m', stationary brackets m^4, and bar N and suitable means for operating the latter, for the purposes specified.

6. In a paper-cutting machine having a clamp-bar provided with a hand-screw for applying pressure thereto, the means herein set forth for slightly lowering and raising said clamp and screw, the same consisting of extension l', connected to said screw by set-collars l^2, rod M, connected to said extension and having a nut m' near its lower end, toggle-bars m^2 and m^3, shifting-bar N, pivotally connected to levers N' N^3, the latter being rigidly connected to shafts N^2 N^4, treadle N^5, connected to shaft N^4, and springs O O', said toggle-bars m^2 being pivotally connected to nut m', stationary brackets m^4, and bar N, all arranged substantially as set forth.

7. A paper-cutting machine having a clamp-bar provided with a hand-screw, and mechanism, substantially as set forth, for slightly lowering, locking, and raising said clamp and screw, in combination with the shaft N^2, having the beveled lug P thereon, and gear B^2, having the lug S connected thereto for automatically unlocking said parts, as set forth.

8. In a paper-cutting machine constructed substantially as set forth and provided with a stop-lug D^3, mounted on shaft D, the means herein set forth for sliding said lug, the same consisting of handle D', collar d^3, bar D^2, and spring d^4, said collar being rigidly connected to the lower end of said handle, the bar pivotally connected to said collar and stop-lug, and the spring interposed between said lug and the stationary bearing d', as set forth.

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