N. GRAY, Jr. & D. T. WADHAMS.

PAPER CUTTING MACHINE.

APPLICATION FILED JULY 24, 1908.

996,327.

Patented June 27, 1911.

9 SHEETS—SHEET 1.

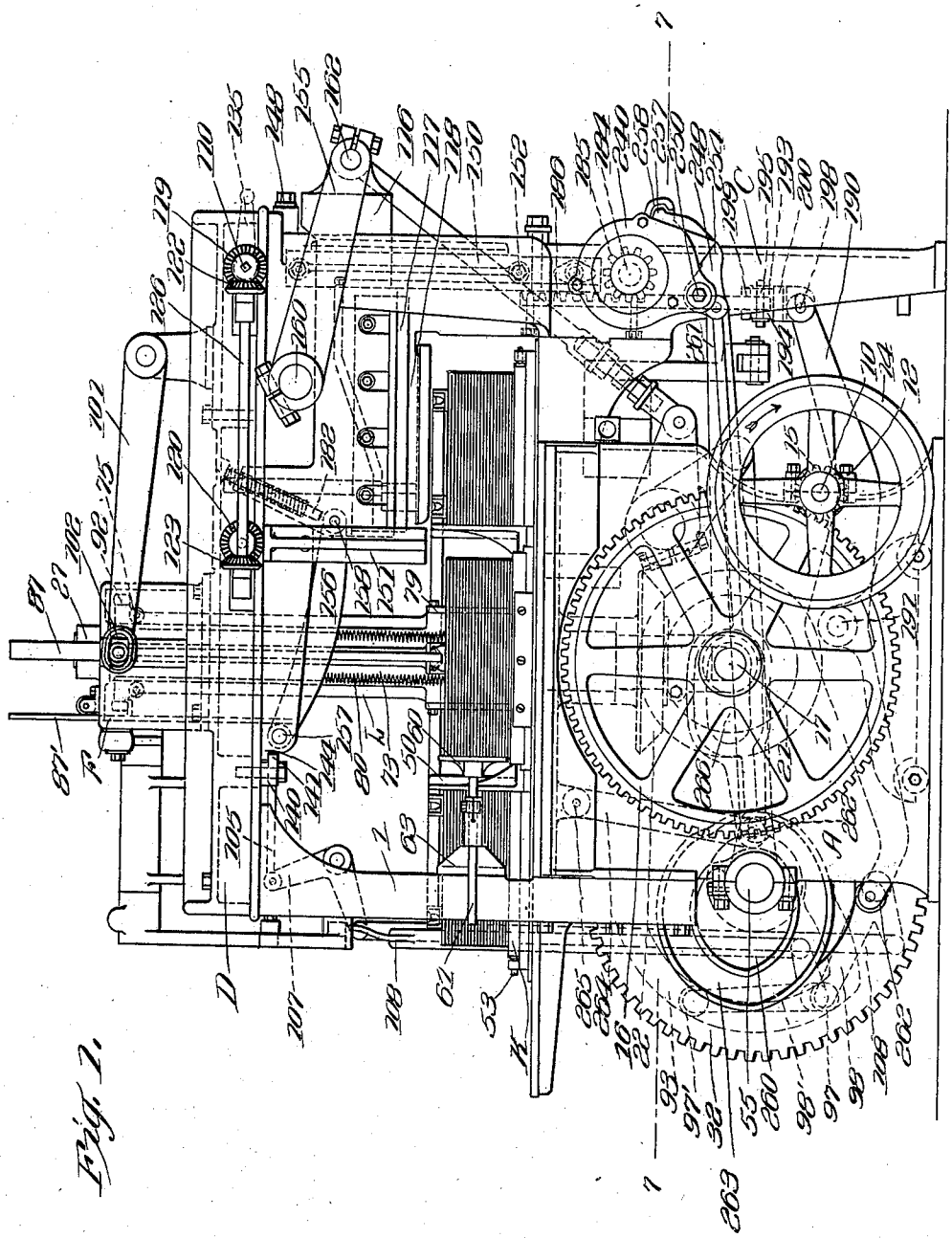

Fig. 1.

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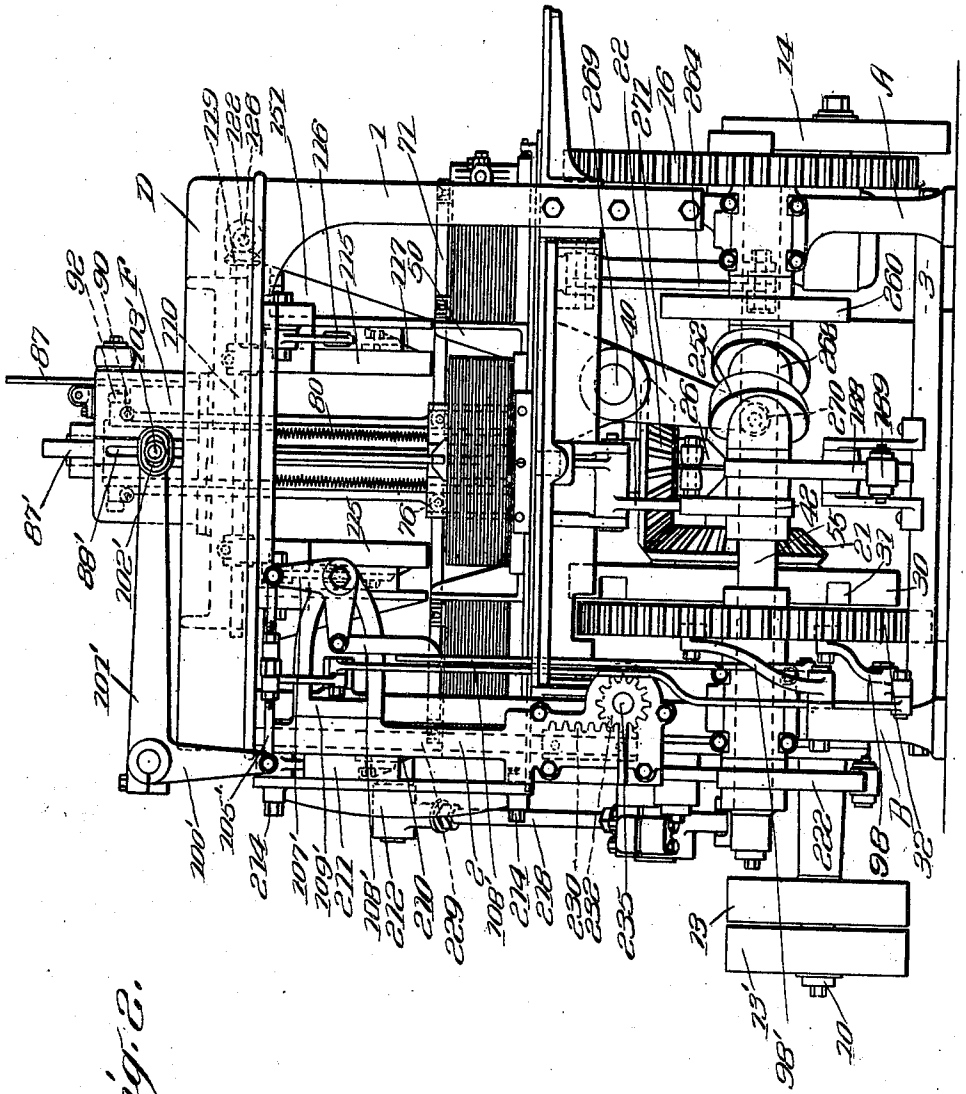

Fig. 2.

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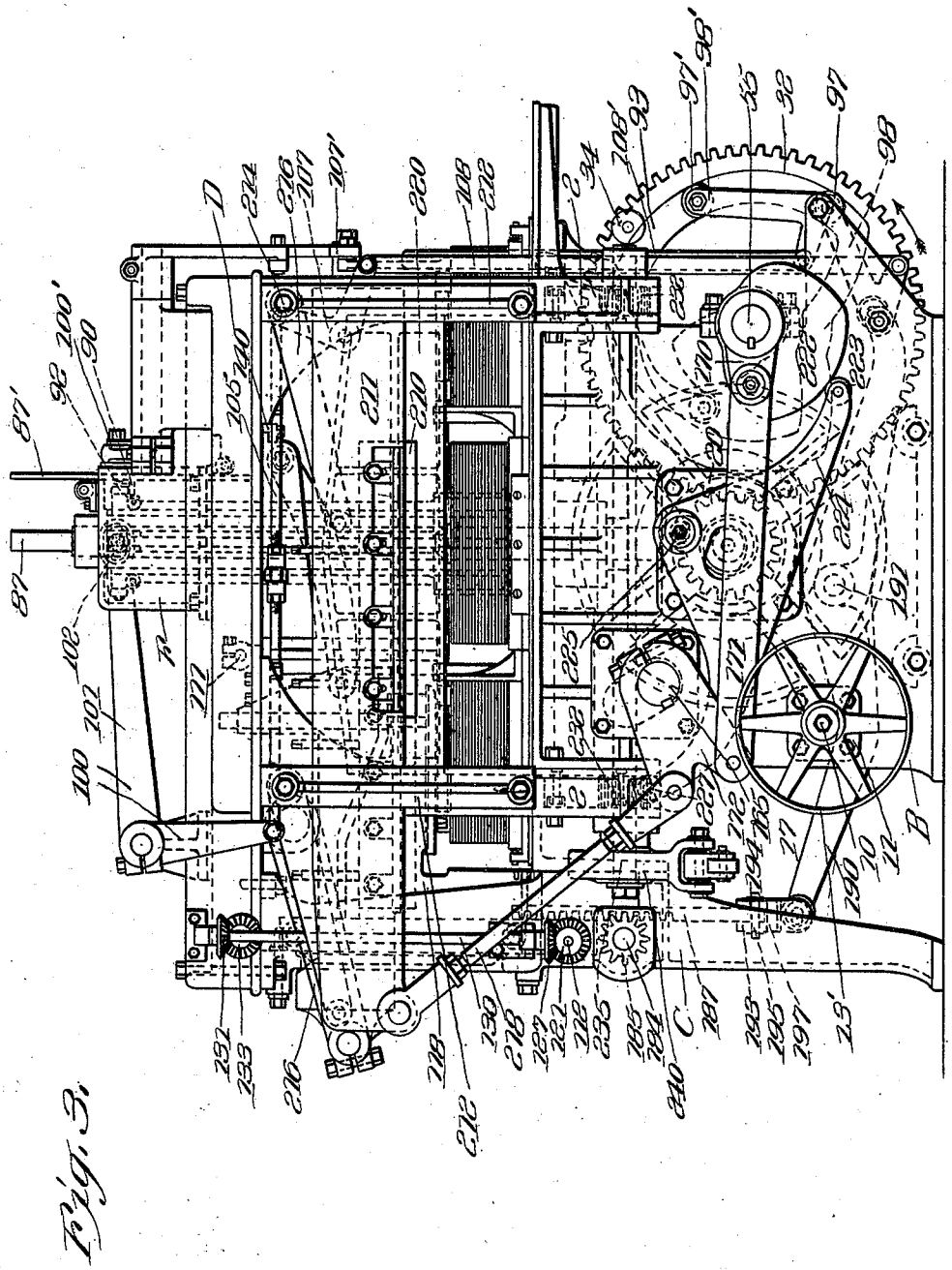

Fig. 3.

WITNESSES

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Fig. 23.

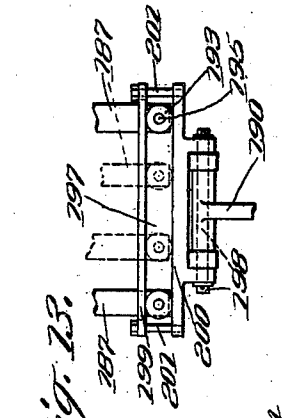
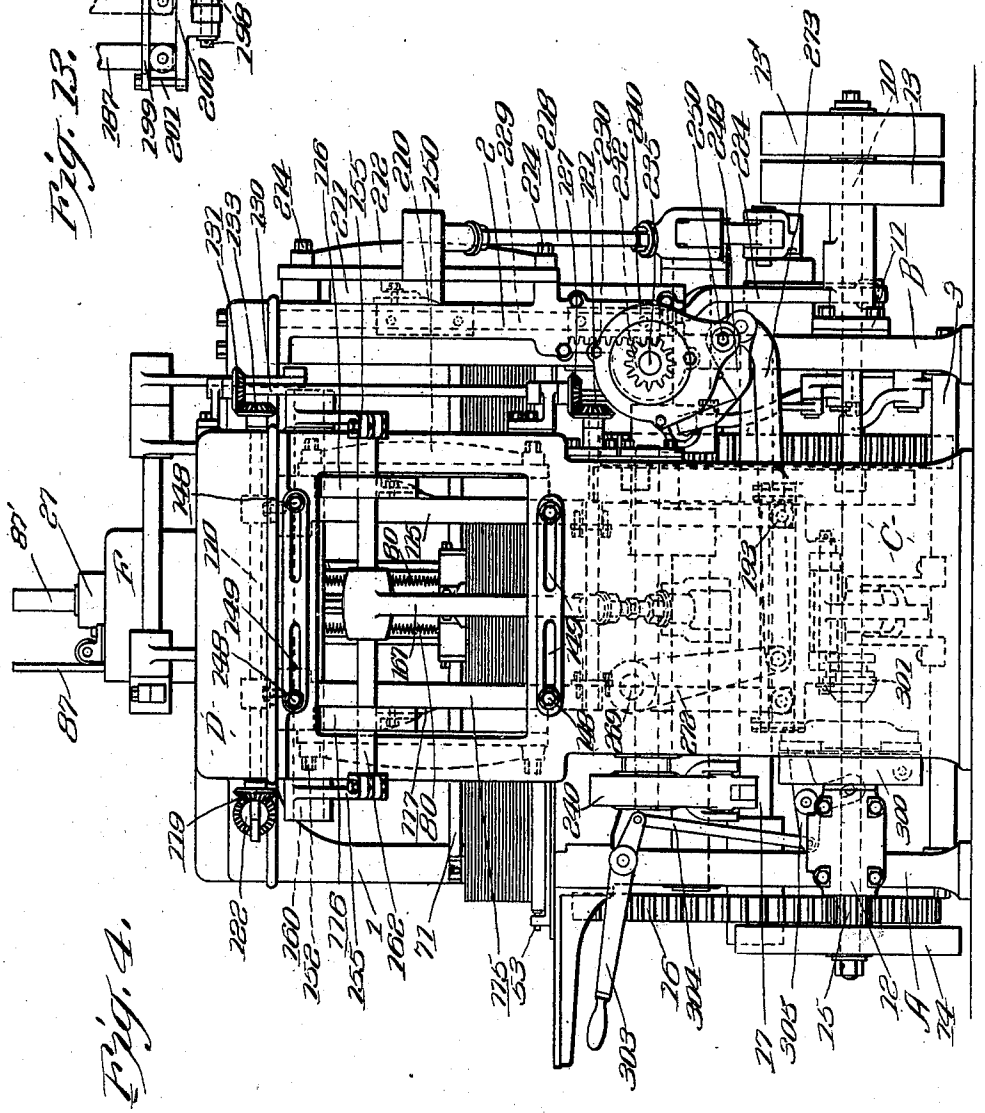


Fig. 4.



Witnesses

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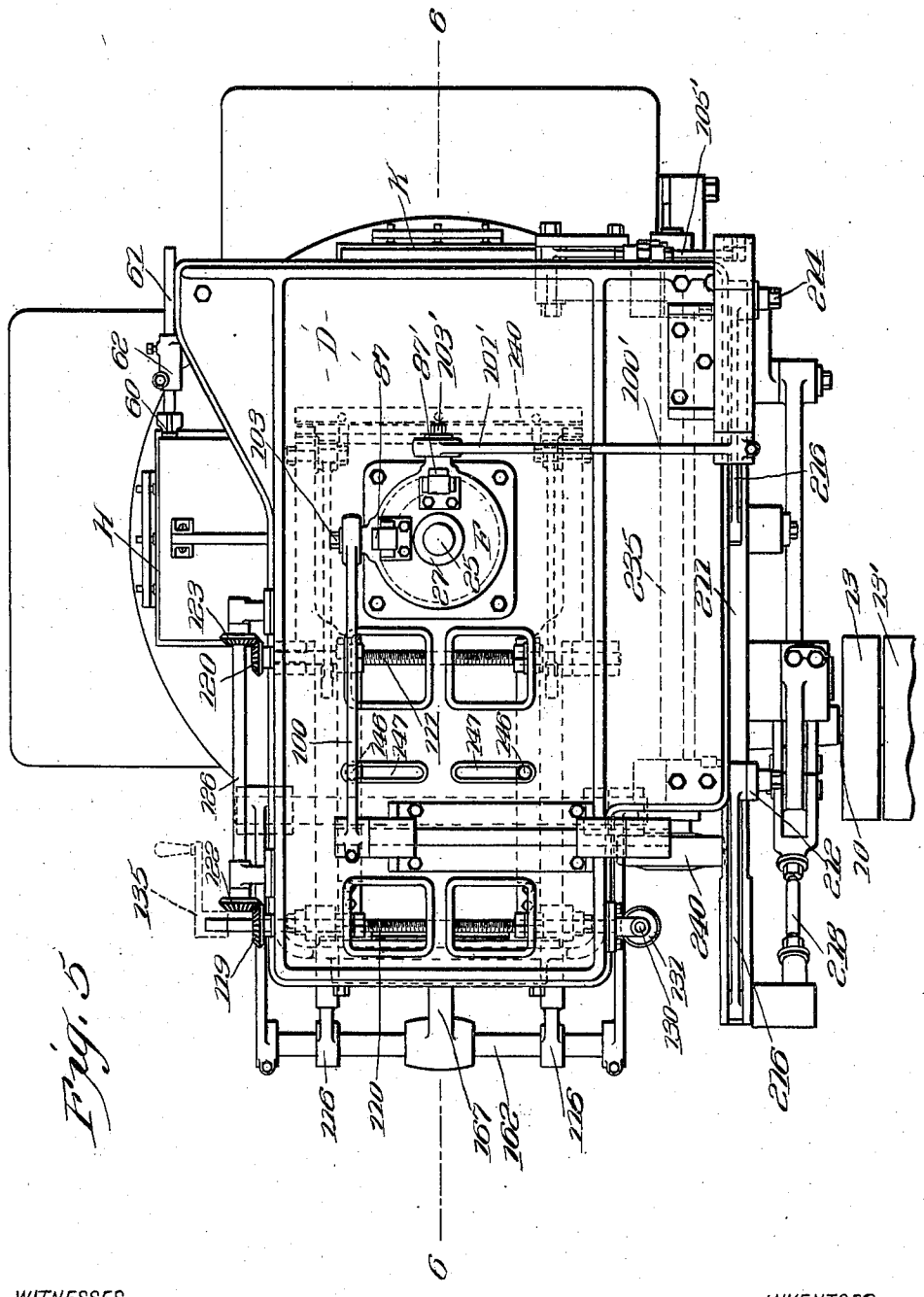

Fig. 5.

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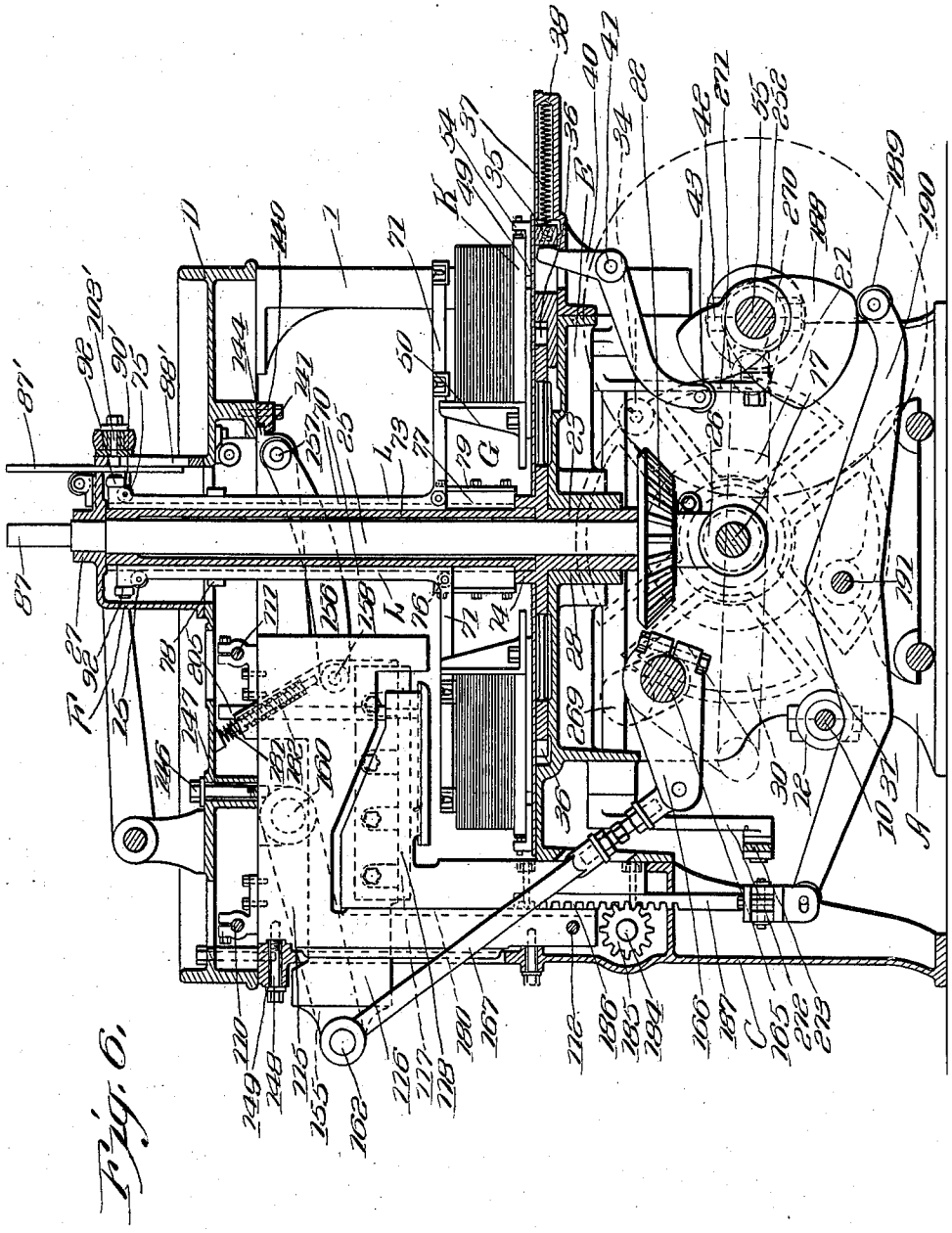

Fig. 6.

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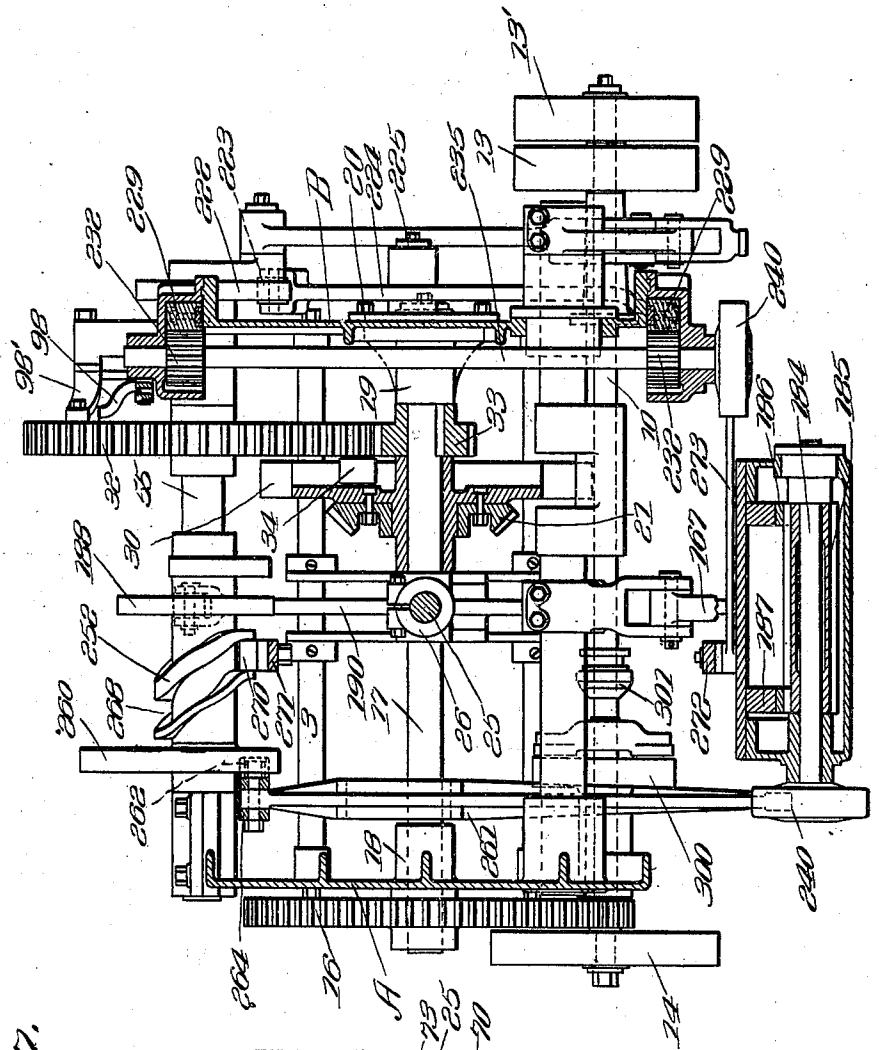

Fig. 7.

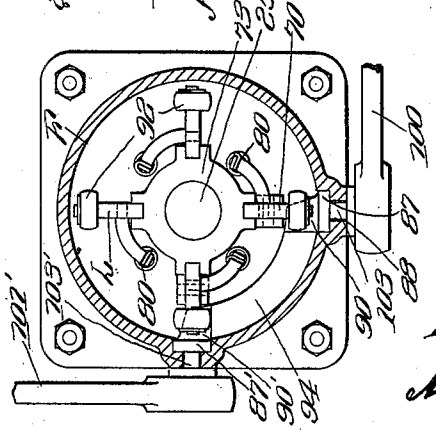

Fig. 9.

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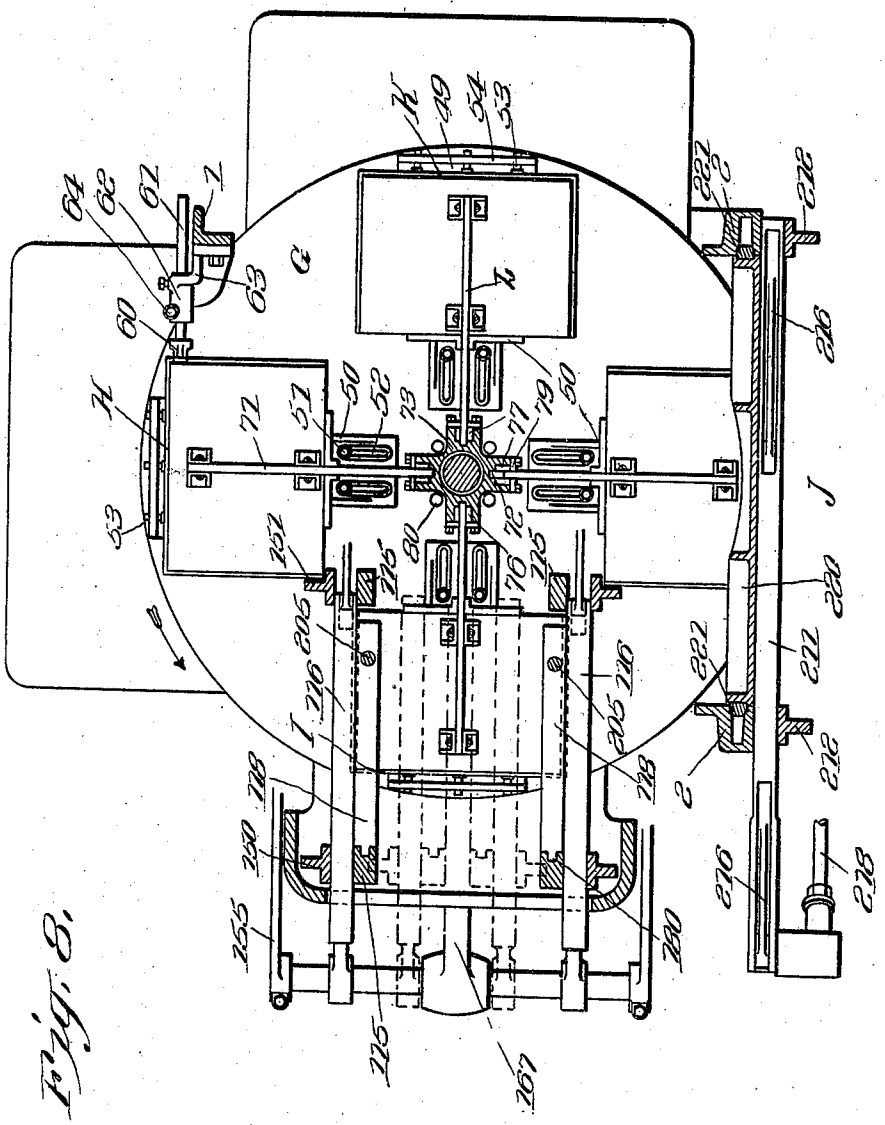

Fig. 8.

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9 SHEETS—SHEET 9.

Fig. 10.

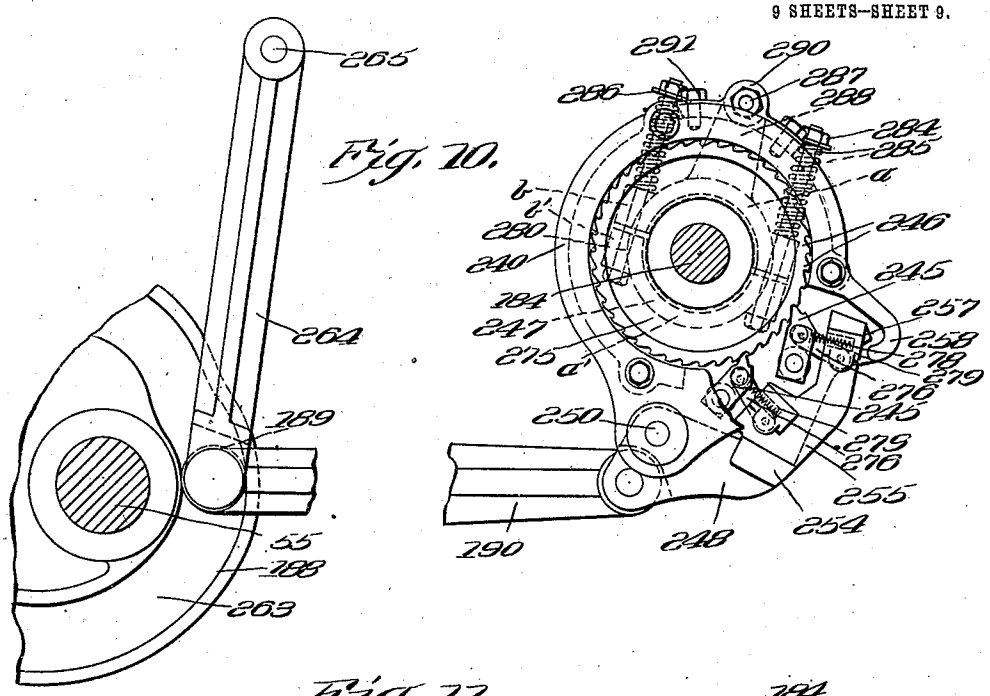


Fig. 11.

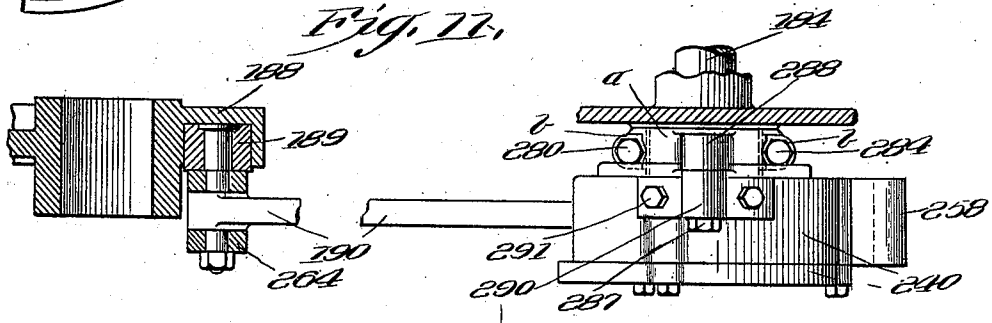
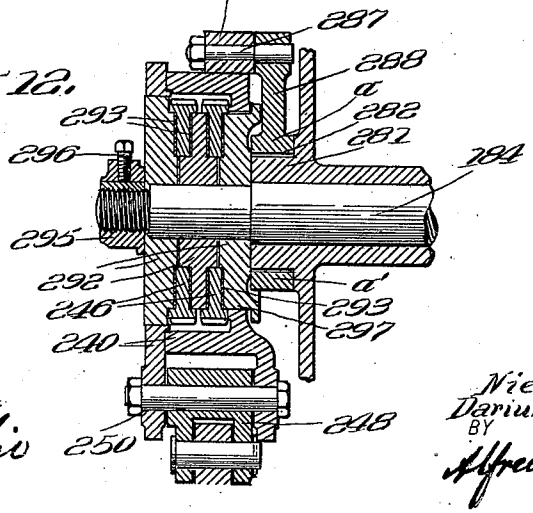


Fig. 12.



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UNITED STATES PATENT OFFICE.

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PAPER-CUTTING MACHINE.

996,327. Specification of Letters Patent. Patented June 27, 1911.

Application filed July 24, 1908. Serial No. 445,259.

To all whom it may concern:

Be it known that we, NIEL GRAY, JR., and DARIUS T. WADHAMS, citizens of the United States, residing at Oswego, in the county of Oswego and State of New York, have invented new and useful Improvements in Paper-Cutting Machines, of which the following is a specification.

Our invention relates to paper cutting machines for trimming the edges of books, pamphlets, piles of paper, etc., and consists in a continuously operating machine, whereby all the operations are effected automatically and rapidly, trimming three sides of the pile of paper.

The object of this invention is to provide means by which the piles of sheets of paper of varying heights may be continuously set in place in the machine by an operator against suitable gages and then automatically held, clamped and accurately cut on three sides and delivered to a position to be removed from the machine by a second operator.

The important features of our invention are, (1) a table provided with four cutting blocks or suitable means for supporting four piles of paper, and with four back gages, one for each of the piles; (2) four pile holders, one for each pile, which operate automatically and adjust themselves automatically to piles of various height; these pile holders are intended for two particular purposes (a) to force the air from between the sheets so that the piles of sheets will be compacted and ready for the pressure of the automatic clamps which hold the piles firmly along the line of cut while the knives are cutting, (b) and to steady and hold the piles in place automatically during the rotation of the table and then to automatically release the piles when they come to the take out position. (3) A pair of parallel knives and corresponding parallel clamps whereby the sides of the piles are clamped and cut similarly in one position; (4) a third knife and clamp arranged to operate to cut the rear edge of the pile when brought into another position; this third knife and clamp are preferably arranged parallel to the side cutting knives; (5) means to rotate the table to bring the piles into the four positions, namely the feeding position, the two cutting positions and the take out position; means for operating the three sets of knives and clamps and to adjust the side knives and clamps to cut piles of various widths, and means for raising the pile holder in the take off position to free the pile and to lower the pile-holder in the first position onto a new pile.

The operation of our mechanism is very rapid being only limited by the capacity of the operator to put on and take off the piles and it is therefore particularly adapted for cutting large quantities of paper very rapidly for instance trimming magazines, which are now produced in such large quantities and must be prepared for distribution within a limited length of time. Adjustment of the pile holders is not necessary for they adapt themselves equally well to piles of varying thickness, but it will be understood that it is not desirable, generally speaking, to cut piles of more than six inches or so in thickness, as this is about the maximum height which is convenient for the operator to handle rapidly and easily.

The use of the clamps operating independently from the pile holders is essential, fully to compact and hold the pile at the time of cutting, so that there may be no variation in the size of the cut sheets, particularly the variation between the sheets at the top and bottom, which has heretofore been an objection to many forms of good machines, from the draw of the clamp on the paper. By use of pile holders, in the first place to compact and hold the sheets, the danger of such draw by the clamps in machines of this class is practically entirely overcome.

Figure 1 is a front elevation of a paper cutting machine made according to our invention; Fig. 2 is an elevation of the left side; Fig. 3 is a rear elevation; Fig. 4 is an elevation of the right side; Fig. 5 is a top plan view; Fig. 6 is a vertical longitudinal section taken on the line 6—6 of Fig. 5; Fig. 7 is a horizontal section on line 7—7 of Fig. 1; Fig. 8 is a diagrammatic plan view of the turn-table with the piles thereon, showing also the pile holders, knives and clamps. Fig. 9 is a horizontal cross section through

the dome. Figs. 10, 11 and 12 illustrate the friction pressure mechanism. Fig. 10 being substantially a side elevation thereof, with the outer friction disk removed; Fig. 11, a plan; Fig. 12 a vertical cross section taken substantially centrally through the case. Fig. 13 is a detail.

A and B represent the front and rear supporting standards of the machine and C the right end supporting standard thereof. On one end of the standard A is bolted the post 1 and on each end of the standard B are bolted the posts 2. Secured on top of the posts 1 and 2, and the standard C is the top plate D.

E is the turn table supporting plate secured at the top of the standards A and B. Secured to said standards near the lower edges thereof, and extending from one to the other are brace rods 3 which hold the standards rigid at the bases thereof.

10 is the drive shaft extending across the machine and supported in bearings 11 and 12 on the members B and A. Mounted on the rear end of said shaft is the pulley 13 to which power is applied to drive the shaft.

13′ is an idler (Figs. 2 to 4.)

On the front end of shaft 10 is mounted a fly-wheel 14 to cause the shaft to rotate smoothly. Keyed on this end of said shaft near said fly wheel is a pinion 15 which meshes with the large gear 16, mounted outside of member A on the shaft 17. This shaft extends through the center of the machine and is journaled in bearings 18 and 19 in members A and B. The bearing 19 is detachably secured to the standard B by bolts extending through the flange 20 formed on the bearing, and screwing into said standard. (Figs. 3, 7.) This bearing extends through an opening in the member B and may be readily removed therefrom by unscrewing the bolts so that access may be had through said opening to the interior of the machine. This arrangement of this bearing is of great convenience in assembling the machine. Loosely mounted on this shaft 17 near the center of the machine is a bevel gear 21 which meshes with another bevel gear 22 keyed on the lower end of the sleeve 23. This sleeve, integral with the turn table G, extends downwardly from the lower surface thereof and is secured to the vertical shaft 25, near the lower end thereof. The lower end of this shaft is journaled in the bearing 26, which rests on shaft 17, while the upper end of said shaft is journaled in the bearing 27 formed in the top of dome F which is bolted on the top plate D. The turn-table G is supported on the table frame E and the sleeve 23 of the turn table fits in the bearing 28 formed integral with said frame E and extending downwardly from the under side thereof.

Table movement.—To rotate the table in successive quarter turns with a suitable rest between each movement, during which the cutting may be performed, there is provided a *Geneva movement* (*Figs. 2, 3, 6 and 7*) consisting of a disk 30 having slots 31 arranged across its face at right angles to each other, secured to the bevel gear 21. On the front face of the large gear 32, fixed on cam shaft 55, is arranged a roller 34 which by engaging these slots in turn rotates the table one quarter turn, and then while the gear is turning three quarters of a revolution the table is at rest. The gear 32 is driven by a smaller gear 33 on the cross shaft 17. This effects an excellent table motion, as it starts from rest and operates with gradually accelerating motion as the roller nears the shaft 17, and, after passing mid position, acts reversely, retarding it until it again comes to a complete rest, in which position it may be positively secured by a suitable catch until the table is again rotated. A desirable spring latch for this purpose is shown (Fig. 6) having a dowel pin 35 arranged to engage notches 36 of which there are four in the circumference of the turn-table, and forced into engagement therewith by spring 37 arranged in bracket 38. A bell-lever 40 suitably pivoted at 41 is operated by a cam 42 on cam shaft 55, by the engagement of a roller 43 on the lower bell-lever arm, to withdraw the dowel from engagement with the notch immediately before the table is rotated and to release it to again operate when it comes into registration with the succeeding notch.

Secured on top of the turn-table are four plates 49 for the cutting blocks H. I. J. and K. and four back gages 50 arranged at 90° apart. The gages are secured to the turn table by bolts 51 extending through slots 52 in the same and are adapted to be adjusted to different size piles by loosening said bolts and moving the gages to the desired position and then tightening the bolts. The blocks are held in place against the back gages by clamping screws 53 in shoulders 54 (Figs. 6 and 8).

60 is an end gage having a shank 61 extending through a clamping member 62 formed on a bracket 63 secured to the standard 1. This gage may be adjusted to different size piles by loosening the bolts 64 in the clamping member then moving the gage to the desired position and then tightening the bolts (Figs. 1, 5 and 8).

In feeding the machine a pile is placed on the cutting block H in the position shown in Fig. 8 of the drawings with the back edge thereof resting against the gage 50 and one end thereof resting against the gage 60. The gages are so adjusted with respect to the size of the pile, that when the pile is thus placed on the cutting block it will be in the proper position to be cut when brought into

registration with the cutting knives to be hereinafter described.

Pile holders.—L indicates the L shaped pile holders, having horizontal arms 71 and vertical arms 70 fitting in vertical slots 72 in the vertical sleeve 73 which surrounds the shaft 25. The upper end of this sleeve fits loosely to the shaft 25 while the lower end thereof is secured to the flange 74 formed on the turn table G. (Figs. 6 and 8.) Carried on the upper and lower ends of the arms 70 are the rollers 75 and 76. The rollers 75 engage the outer surface of the sleeve 73 while the rollers 76 fit loosely in the recesses 77, formed in the lower portion of said sleeve and engage the inner end surfaces thereof, whereby the pile holders are adapted to reciprocate smoothly in their respective slots. Surrounding the sleeve 73 and the arms 70 near the upper ends thereof, and secured to said sleeve, is a collar 78. (Fig. 6.) Secured near the lower end of the sleeve and extending in front of the outer ends of the recesses 77 are the plates 79. The front surfaces of the arms 70 engage the inner surfaces of the collar 78 and the rollers 76 engage the inner surfaces of the plates 79, whereby the arms 70 are maintained in their slots 72 with the rollers 75 engaging the outer surface of said sleeve and the rollers 76 engaging the inner end surfaces of the recesses 77. Springs 80 connected to outwardly extending pins in the upper end of the pile holders and to the table below are provided to pull the pile holders down upon the work with sufficient tension to expel air from and to hold the work during the rotation of the table.

Lifters.—To raise the pile holders at the proper time and to lower them upon the work, lifters 87—87′ are arranged to reciprocate vertically in slots 88—88′ in the interior of the dome F, and provided with lugs 90—90′ to engage the rollers 92 on the upper end of each pile holder, after each quarter turn of the table. (Figs. 1, 2, 6 and 9). These lifters are operated from cam-groove 93 formed in the gear 32 on the shaft 55 and are timed so that the lifter 87′ will be in its extreme lower position when the table stops after each quarter turn and will then be immediately raised to an elevated position lifting the holder and releasing the work in the fourth position to be withdrawn before the table is again rotated. In this elevated position the roller 92 of the pile holder is in position so that when the table next rotates the roller rolls from the lug 90′ on to track or shelf 94 arranged in the interior of the dome F. This elevated track extends quarter way around the dome and is arranged at its other end to deliver the roller 92 on to the lug 90 of lifter 87 which is similarly operated to be in its elevated position to receive the roller from the shelf at the end of each table movement, and to lower the pile-holders on to the new work immediately before the table is again rotated so that there is time to put in the work. These lifters are operated from the groove 93 with which engage the rollers 97—97′ of the lower bell-cranks 98—98′ connected by suitable connections (next to be described) to the upper bell crank levers 100—100′ journaled on top plate D, and having each one arm 101—101′ slotted at 102—102′ to receive pins 103—103′ on the respective lifters.

105 is a connecting rod pivoted at one end to the lower arm of the upper bell crank lever 100 and at the other end to the upper arm of bell-lever 107 fulcrumed on the left hand side of the machine (as here shown) and having its lower arm connected by link 108 to one arm of the roller bell-crank 98 (Fig. 3). Similarly lifter 87′ is operated through connection 105′ pivoted at one end to the lower arm of the upper bell-crank 100′ and at its other end to the upper arm of bell-lever 107′ fulcrumed on the bracket 109′ secured to one of the uprights 2 and having its lower arm connected to one arm of the roller bell crank 98′ by connecting link 108′ (Fig. 2).

Knife-frames.—Suitably journaled in the standard and in the top plate D are the supporting and adjusting screws 110—111, 112, for the heads or knife frames 115—115, within which are arranged to operate knife-stocks 116—116 carrying knives 117—117 for cutting the sides of the stock and the clamps 118—118 to coöperate therewith. (Figs. 1, 4, 6, 8.) These screws are provided with a right and left hand thread and have on their ends the respective miter gears 119—120—121, of which the miter gears 122 and 123 on horizontal shaft 126 arranged in bearings on the left of the top plate D and the gear 121 meshes with a similar gear 127 on vertical shaft 130 carried in bearings on the rear of the machine, and on which is a second gear 131 meshing with a miter gear 133 on the rear end of the screw 110. By this means the three frame carrying screws are connected up to be operated simultaneously by a crank 135 (Fig. 1.) arranged on the front of screw 110 whereby the frame carrying the end knives and their coöperating clamps may be adjusted nearer or farther from each other to cut stock of varying sizes, which may be indicated by a pointer or graduated scale (not shown) while the knives are always maintained in parallel relation.

Slide-way block 140 is secured to the under side of the top-plate D and is provided with a lower flange 141 upon which rear extension lugs 144 of the heads are arranged to rest and slide during adjustment to relieve somewhat the strain upon the screws dur-

ing the clamping and cutting (Figs. 1, 5 and 6).

146—146 are bolts carried in the heads and extending through elongated slots 147 in the top plate D and 148—148 are similar bolts in slots 149—149 in the member C whereby the heads may be positively secured in adjusted position. (Figs. 4, 5 and 6.)

Side knife operating mechanism.—The side-knives 117 are arranged to operate between guide bars 150—151 secured at each end of the respective frames by bolts 152. Two of these bolts (upper and lower) are used to secure the front guides 150 while the rear guides 151 are secured at their upper ends only and open at the bottom permitting the knives to operate below them. To produce the usual and desired draw cut the knives are carried by links 155—156 of which the links 156 are pivoted at 157 in the extreme left end of the frames and at 158 to the knife-stocks 116 and the front links 155 are carried on cross shaft 160 journaled in suitable bearings arranged on top-plate D, and carry in their lower ends the cross-rod 162 fitted to sliding bearings in the front of the knife stocks, allowing lateral adjustment of the knife-stocks and the knives thereon. (Figs. 4, 5, 6, and 8.) These side-knives are operated from the rock shaft 165 having crank 166 and pitman connection 167 to the center of cross rod 162 whereby the two knives 117 will be simultaneously operated when the shaft 165 is rocked by the operation of crank 170 on shaft 55 connected by connection 171 to double arm 172 fixed on said rock shaft. To prevent "buckling" or binding at the rear of the knife stocks 116 there are provided compression springs 181 arranged in suitable recesses in the rear of the knife stock, said springs being fitted to guide pins 182 and adapted to engage the lower surface of top plate D under tension when in elevated position to depress the stock and prevent buckling as aforesaid. (Figs. 1 and 6.)

Side clamps.—The side clamps 118—118 carried in the heads 115 are arranged to slide vertically in vertical slots 180 in the heads and are operated to clamp the work immediately before being cut and to produce a clamping pressure thereon during the operation of the cutting knives, and to release the work after the knives have been returned to their upper initial position thus preventing disarrangement of the pile during cutting or on the return up stroke of the knives (Figs. 6, 8). These clamps are arranged to drop on to the work by gravity after which they are operated to produce pressure upon the work through the medium of a friction pressure device (to be described) arranged on and operating a clamp shaft 184 upon which is fixed an elongated pinion 185, with which engage racks 186 on depending straps 187 secured to the clamps. In this way the two clamps are operated as one from the clamp shaft and the elongated pinion allows their adjustment, permitting the racks to slide longitudinally thereon (Figs. 1, 3, 6 and 7).

To raise the clamps, a lift cam 188, carried on cam shaft 55 engages a roller 189, on one end of a rock-lever 190, fulcrumed at 191 on the standard A and connected to the clamp straps 187 at its other end by the engagement of front and rear anti-friction rollers 193—194 on pins 195 in the lower extremity of the clamp straps with the horizontal double track 197 formed between upper slotted piece 199 and lower track piece 200, pivoted to the rock-lever by pin 198. The clamp straps extend through the upper slotted track piece 199 which is secured at either end to the lower piece 200 by bolts 201, to retain between them the anti-friction rollers to operate in the horizontal track so formed to allow the longitudinal adjustment of the clamps with the heads (Figs. 1, 4, 6 and 13).

Guide pins 205, fitting guide slots in the heads, are carried on the inner ends of the side clamps to prevent binding and to maintain the clamps in correct position during the operation. (Figs. 6 and 8.)

Rear knife and clamp.—After the side knives have operated, the next quarter turn of the table brings the stock into position to be trimmed on its front edge by a third knife arranged at the rear of the machine. This rear knife 210 is carried in its knife stock 211 arranged parallel to the side-knives and operates in guideways formed by the uprights 2—2 and guide-bars 212—212 secured to the uprights by bolts 214. This knife-stock is supported by the usual draw-cut links 216—216 and is operated by pitman 218 pivoted to the stock and to one arm of the double crank 172 on rock-shaft 165, whereby all three knives are operated simultaneously from the crank 170 connected to the double crank by connection 171. (Figs. 2, 3, 4 and 8.)

The rear clamp 220, arranged to coöperate with the rear knife, slides in slideways 221—221 in the uprights 2—2, and, as in the case of the side-clamps, is raised by a lift cam and lowered upon the work by gravity as the cam permits. This lift cam 222 on cam shaft 55 is arranged for this purpose and operates to raise the rear clamp by depressing the anti-friction roller 223 on one end of the rock lever 224, fulcrumed at 225 on the flange 20 of bearing 19, and having on its other end a roller 227 in engagement with the under portion of one of the straps 229. Preferably there are two of these straps, one at either end of the clamp and secured thereto, and each provided with a lower rack 230 in engagement with rack

gears 232—232 on clamp-pressure-shaft 235 arranged in suitable bearings. Engagement of the rock-lever with only one of the clamp straps is necessary as the racks receive the same movement by the engagement of the rack-gears on the clamp shaft thus preventing binding. Arranged on the clamp shaft 235 is a friction pressure device similar to that on the side clamp-shaft and for a similar purpose of producing a clamping pressure on the work.

The pressure devices here shown consist substantially of pressure-cases 240, arranged on the end of each clamp shaft, which when oscillated in one direction produce pressure upon the work by engagement of pawls 245 carried therein with ratchets 246 of a friction mechanism inclosed, slipping the friction when the clamps bear upon the work with sufficient pressure. These pressure cases are each retarded in their movement by a friction band 247 secured to the case and in frictional engagement with suitable flanges on the frame. The purpose of thus retarding the case is to allow the jaw 248, which offers less resistance than the case and through which the case is rotated, to first operate the pawls 245 with which it is connected, to force them into or out of engagement with the ratchets, after which further movement imparts motion to the pressure-case, slipping its retarding friction, and if on the forward movement when the pawls are in engagement, producing pressure upon the work. These jaws are pivoted on the pressure cases at 250 and are operated through suitable connections by the respective pressure cams 260—252, carried on cam shaft 55. Arranged on the jaws are forward stops 254 to engage opposing stops 255 on the cases when the pawls have been forced into engagement by its forward movement and jaw stop 257 is for a similar purpose to engage case-stop 258 on the reverse movement, after the pawls have been positively withdrawn from engagement, and as will be readily understood, further movement of the jaw after engagement of the stops will oscillate the case to produce the pressure or to return it to its initial position.

The side clamp pressure device is operated by its pressure cam 260 through connecting link 261 pivoted to the jaw at one end and having a roller 262 at its opposite end engaging cam groove 263 of the cam wheel 260 by which it is operated. The connecting link is supported, at its roller end, by link 264 connected to the roller pin and pivoted at 265 on the frame, and is slotted at 266 to clear the shaft 17.

Pressure cam 252 for the rear clamp is provided with peripheral cam groove 268, which operates to rock the rock shaft 269, carried in suitable bearings, by the engagement therewith of roller 270 of arm 271, secured to the rock shaft, which is connected at its opposite end to operate the pressure device by arm 272 thereon connected to the pressure jaw by link 273.

Further to describe the friction pressure mechanism shown in detail in Figs. 10, 11, 12,—pawls 245 are arranged to engage ratchet teeth 246 on ratchet-wheels 275 of the friction device, loosely carried on the clamp-shaft and are operated by the pressure-jaws 248 through the links 276 and held normally in engagement by springs 278 arranged in sockets 279. As shown the pawls are arranged so that when one is in engagement the other engages the middle of a tooth thus limiting lost motion.

In the retarding mechanism, the brake consists of a two piece brake-ring 247 fitted to a flange 281 on the frame upon which is arranged a fiber ring 282. On the halves *a*—*a'* of the brake-ring are arranged opposing ears *b b'* in which are carried the bolts 280 having on their upper ends friction adjusting nuts 284 and upon which are carried compression-springs 285 arranged between washers 286 and the brake-ears *b*, the said washers and ears forming bearings therefor. The upper half of the brake-ring is connected to the pressure-case by bolt 287, carried in arm 288 integral with the ring, fitting lug 290 carried on the pressure-case, the said lug being secured by bolts 291.

Of the friction mechanism there are keyed on the clamp shaft disks 292 adapted to frictionally engage the ratchet-wheels 246 through the interposition of the fiber friction rings 293. These disks are arranged between flange 281 on the frame and the adjusting nut 295 on the end of the clamp shaft. This adjusting nut is to tighten or loosen the disk to regulate the clamping pressure and after being adjusted may be secured by set-screw 296.

As best shown in Fig. 12 the outermost of the friction disks 292 and the aperture in the pressure-case to accommodate said disk are of larger diameter than the inner disks and the ratchet-wheels. This allows the ratchet-wheels, two outer disks and the friction rings to be taken out without disturbing the pressure case or the pawls after removing the adjusting nut from the end of the shaft. The innermost disk is provided with a rear flange 297 and between this flange and the inner ratchet-wheel the pressure case is arranged to prevent its longitudinal movement.

On the driving shaft 10 is arranged the usual clutch mechanism for starting and stopping the machine having the inclosing case 300 for the clutch mechanism thrown into engagement by the usual cone 301. Said cone is operated from an operating lever 303 arranged at the front of the machine, through link 304 connected to bell lever 305

suitably journaled and connected to throw the cone into and out of engagement when rocked.

Operation.—Having started the machine by throwing in the clutch a pile, suitably stacked, is placed upon the cutting block, at the front of the machine, against the back and end gage, all the gages having first been adjusted and secured in position for cutting the stock to the desired width. A pile-holder is then lowered upon the pile by lifter 87 and the table is given a quarter turn by the engagement of roller 34 with slot 31 of the slotted disk. This brings the pile in position to be clamped and cut by the side-clamps and knives, which then operate, to trim the sides or heads of the books. While this clamping and cutting is being performed a second pile is placed upon the succeeding cutting block and the succeeding pile-holder, delivered upon the lifter 87 from the shelf 74, is then lowered upon the second pile, by said lifter, immediately before the table is again given another quarter rotation which brings the first pile into a third position at the rear of the machine, to be trimmed on its front edge by the operation of the rear clamp and knife, while the second pile is brought into position to be operated upon by the side-clamps and knives. The clamps and knives again clamp and cut, this time on two piles, and at the same time a third pile is placed on the cutting block at the front of the machine. Again the table is given a quarter rotation and the first pile, now trimmed on three sides, is brought into a fourth position, where the lifter 87′ immediately operates, elevating the pile-holder to release the finished pile, whereby it may be removed from the machine. Thus after each successive quarter rotation of the table the lifter 87′ elevates the pile-holder in the fourth position, releasing the finished pile; the clamps and knives operate to trim the sides of the pile in the second and the front edge of the pile in the third positions and immediately before the table is again rotated, return to their initial positions, and the lifter 87, now in upper position, lowers the pile holder in the first position upon a new pile, to rotate with and hold said pile during the rotation of the table. The table is then rotated and the pile holder in the fourth position, elevated by lifter 87′, rolls from said lifter onto and over shelf 74 and is received, at the end of the table movement, by lifter 87: the lifters 87′ and 87 returning to their respective initial lower and upper positions during the rotation of the table. Each successive operation therefore, if first operator is sufficiently skilled in feeding, will bring a completely trimmed pile of books to the second operator to be removed from the machine. If, however, the first operator should miss putting in a pile, it will have no effect whatever upon the machine except to reduce the output.

Having thus described our invention, what we claim is:—

1. In a paper-cutting machine having a suitable frame, cutting knives suitably arranged, clamps to coöperate with the knives, means to move the piles under the knives and clamps, means to operate the knives, means to operate the clamps, pile-holders arranged to be movable with the piles, means tending to depress the pile-holders onto the piles, means to overcome said depressing means to elevate the pile-holders to release the finished piles, lowering means to receive the holders in elevated position and lower them onto the new work to compact the piles preparatory to cutting, and means to maintain the pile-holders in elevated position from the point of elevation to deliver them to the lowering means.

2. In a paper cutting machine, a standard, a table, means to rotate the table to feed the work to the cutting mechanism, a member centrally arranged with relation to the table and connected to rotate therewith, said member having vertical slots therein, and pile holders having in combination, vertical members fitted to said slots to operate vertically therein, horizontal members carried on the vertical members to engage the work, rollers carried on the vertical members to be engaged by a releasing means and said vertical members being also provided with pins for an actuating spring.

3. In a cutting machine, a standard, a table, means to rotate the table with successive quarter rotations to feed the work to the cutting mechanism, a member centrally arranged with relation to the table and connected to rotate therewith, said member having vertical guide-ways therein, and pile-holders having in combination vertical members fitted to reciprocate vertically within said guide-ways, horizontal members carried on the lower end of said vertical members and adapted to engage the work, anti-friction rollers on the vertical members in engagement with the guide-ways and rollers carried on the upper vertical member ends to be engaged by a releasing means, said vertical members being also provided with pins for actuating springs connected thereto.

4. In a paper cutting machine, the combination with a rotating table and pile holders for holding the paper piles on the table, of a pair of parallel side-knives arranged on one side of the machine, a third knife arranged at the rear of the machine and parallel to the side-knives, cutting blocks arranged on the table, means to rotate the table to bring the paper pile on each block

successively into the side and the rear cutting positions, means to operate the knives in unison to cut opposite sides of the pile in the former position and to cut a third side of the pile in the latter position, clamps to coöperate with the knives, means to depress the clamps on the piles immediately before and to elevate the clamps immediately after the operation of the knives, means tending to force the holders into engagement with the work to hold the piles, and means to overcome said holding means, operative in the position immediately succeeding the rear cutting position, to release the finished work, and means to retain the holders out of operation until in the position immediately preceding the first cutting position and immediately before the rotation of the table.

5. In a paper cutting machine the combination with a rotating table and pile-holders rotating with the table for holding paper piles on the table, of a pair of parallel side-knives arranged on one side of the machine, a third knife arranged at the rear of the machine and parallel to the side-knives, four cutting blocks symmetrically arranged on the table, means to rotate the table step by step to bring the paper pile on each block successively into the side and the rear cutting positions, means to operate the knives in unison in the interval between the table feed movements, to cut opposite sides of the pile in the former position and to cut a third side of the pile in the latter position, clamps to coöperate with the knives, means to depress the clamps on the piles immediately before and to elevate the clamps immediately after the operation of the knives, springs tending to pull the holders down onto the work, lifters arranged to engage the holders in the respective non-cutting positions, means to elevate the lifter in the position immediately succeeding the second cutting position immediately after the rotation of the table to release the finished work, means to retain the holders in elevated position during their movement from said releasing position to the position immediately preceding the first cutting position and to deliver the holders onto the lifter in said position, and means to lower said lifter immediately before the rotation of the table to deliver the holders onto the new work.

6. In a paper cutting machine, a table, four cutting blocks arranged symmetrically on the table for the paper piles, means to rotate the table in successive quarter rotations to bring the blocks successively into four stop positions, back gages for the piles adjacent to each block, an end gage suitably arranged in the first stop position to gage the placing of the piles on the blocks, cutting knives arranged in the second and third stop positions, clamps to coöperate with the knives, means to operate the knives, means to operate the clamps, four pile-holders arranged to hold the paper-piles on the respective blocks, and arranged to rotate therewith, means tending to depress the pile holders onto the piles, lifters arranged respectively in the first and fourth stop positions, means to operate the latter lifter to elevate the pile-holder in the fourth position to release the finished work, means to retain the pile-holders elevated from their point of elevation to the first position, and means to operate the lifter in the first position to lower the pile holders onto the new work.

7. In a paper cutting machine having a clamp, a clamp operating shaft and connections between the clamps and the shaft, a friction pressure device arranged on said shaft having in combination, disks secured to the shaft, ratchet wheels loosely journaled on the shaft in frictional engagement with the disks, a pressure case suitably journaled, pawls pivotally arranged in the case adapted to engagement with the ratchets, a pawl actuating jaw pivotally hung in the pressure case, connections between the jaw and the pawls, means connected to the jaw whereby the jaw and the pressure case are oscillated and a friction brake to retard the movement of the pressure case to insure the operation of the jaw before movement is imparted to the case.

8. In a friction pressure device for the clamp of a paper cutting machine, a clamp shaft, friction disks fixed on said shaft, ratchets journaled on the shaft and arranged between and in frictional engagement with the disks, a pressure-case suitably journaled, pawls pivoted within the case and adapted to engagement with the ratchets, a pawl actuating jaw pivotally hung in the pressure case, connections between the jaw and the pawls whereby the pawls are actuated by the movement of the jaw, means connected to the jaw whereby the jaw and the pressure case are oscillated, means to retard the pressure-case to insure first the operation of the jaw, said pressure case forming an inclosure for the ratchets and disks, and having an aperture for the outermost disk, the said outermost disk being larger in diameter than the ratchets or the inner disks whereby they may be withdrawn on the removal of said outer disk.

9. In a continuous paper cutting machine, the combination with a frame, of a rotating table thereon, four cutting blocks arranged symmetrically on the table, means to rotate the table step by step to bring each block into four successive positions, an adjustable back gage for each block, an adjustable

side gage for each block, a pair of parallel side knife frames, parallel side knives in said frames, parallel side clamps in said frames, means to adjust the frames at varying distances from each other, means to operate the knives in unison to cut opposite sides of the paper when the pile is in the second position, means to depress the clamps on the paper immediately before and to elevate the clamps immediately after the operation of the knives, a back knife arranged above the block in the third position, a back clamp, means to operate the back knife to cut the third side of the paper means to operate the back clamp immediately before and after the back knife, a guide member centrally arranged with relation to the table and connected to rotate therewith, said member having vertical guide-ways therein, four pile holders arranged to reciprocate vertically in said guide-ways, said holders being arranged correspondingly with the cutting blocks, springs to depress the pile holders on the paper on the respective blocks, rollers on the pile holders, a lifter arranged in the fourth position and adapted to engage the lower portion of the pile holder roller, means to operate said lifter to elevate the pile holder immediately on its reaching fourth position to release the finished work and permit its withdrawal, a track suitably arranged to maintain the pileholders in elevated position from the point of elevation to the first position, a similar but reversely operated lifter in the first position means to operate said latter lifter to be in elevated position at the end of each table movement to receive the pile-holders and to lower the holders onto the new work immediately before each table movement, and means to rotate the table step by step with successive quarter rotations.

10. In a continuous paper cutting machine, a suitable standard, a power shaft, a drive shaft, connections between said shafts, a circular work table, a vertical shaft centrally journaled with relation to the work table and secured thereto, connections between the driving shaft and the vertical shaft to rotate the latter shaft step by step in successive quarter turns, four cutting blocks arranged symmetrically on the table, an adjustable back gage for each block, an adjustable side gage for each block, a pair of parallel side knife frames, parallel side knives in said frames, parallel side clamps in said frames, means to adjust the frames at varying distances from each other, means to operate the knives in unison to cut opposite sides of the paper when the pile is in the second position, means to depress the clamps on the paper immediately before and to elevate the clamps immediately after the operation of the knives, a back knife arranged above the block in the third position, a back clamp, means to operate the back knife to cut the third side of the paper, means to operate the back clamp immediately before and after the back knife, a guide member centrally arranged with relation to the table and connected to rotate therewith, said member having vertical guide-ways therein, four pile holders arranged to reciprocate vertically in said guide-ways, said holders being arranged correspondingly with the cutting blocks, springs to depress the pile holders on the paper on the respective blocks, rollers on the pile holders, a lifter arranged in the fourth position and adapted to engage the lower portion of the pile holder roller, means to operate said lifter to elevate the pile holder immediately on its reaching fourth position to release the finished work and permit its withdrawal, a track suitably arranged to maintain the pile holders in elevated position from the point of elevation to the first position, a similar but reversely operated lifter in the first position, means to operate said latter lifter to be in elevated position at the end of each table movement to receive the pile holders and to lower the holders onto the new work immediately before each table movement.

11. In a paper cutting machine having a main frame and suitable cutting mechanism arranged thereon, means to move the paper piles into position to be operated upon by the cutting mechanism, pile-holders arranged to be movable with the piles, means to effect a constant holding pressure on the piles by the holders throughout the movement of the piles, and pile-holder engaging means automatically operating to elevate the pile holders to release the finished piles and to lower them on the new work preparatory to cutting.

12. In a paper cutting machine, a standard, a table, means to rotate the table, cutting knives, clamps to coöperate therewith, means to operate the knives, means to operate the clamps, pile holders adapted to rotate with the table, means to effect a constant pressure on the piles by the holders throughout the movement of the piles and means automatically to overcome said holding means to release the finished work and retaining means to retain the holders inoperative during the feeding of new work.

13. In a paper cutting machine, having a main frame and suitable cutting mechanism arranged thereon, means to move the paper piles into position to be operated upon by the cutting mechanism, pile-holders arranged to be movable with the piles, means to effect a constant pressure on the piles by the holders throughout the movement of the piles, pile-holder engaging means to elevate the holders to release the finished work and to lower them on the new work preparatory to cutting and means to operate said engag-

ing means respectively immediately after and immediately before the movement of the piles and to return said engaging means to initial position during the movement of the piles.

14. In a paper cutting machine the combination with the table, cutting knives and the clamps coöperating with the knives, of a pile holder for holding paper piles on the table having a member adapted to be vertically reciprocated in suitable bearings, a horizontal member carried thereby and adapted to engage the work, said reciprocating member having secured thereto a spring tending to draw down the holder upon the work, said member also being adapted to the engagement of a releasing means.

15. In a paper cutting machine the combination with a rotating table and pile holders rotating with the table for holding the piles during their passage through the machine, parallel knife frames adjustably secured on one side of the machine, knives carried by said frames, means to operate the knives to cut the piles, clamps operating within the frames to coöperate with the knives during the cutting operation, means independently to operate the clamps to clamp the work immediately before the cutting operation and to release the work immediately after the knives have returned to elevated position, and means automatically to operate the pile-holders to lower them onto the pile to be cut and to release the finished pile.

16. In a paper-cutting machine the combination with the main frame and a rotating table thereon, of parallel frame supports arranged on the frame, knife-frames adjustably carried on said supports, knives carried by said frames, means to operate the knives to cut the piles, clamps operating within the frames to coöperate with the knives during the cutting operation, means independently to operate the clamps to clamp the work immediately before the cutting and to release the work immediately after the knives have returned to their elevated positions.

17. In a paper cutting machine the combination with the main frame and a rotating table thereon, of parallel frame supports arranged on the frame on one side of the center thereof, knife-frames adjustably carried on said supports, knives carried by said frames, means to operate the knives to cut the piles, clamps operating within said frames and adjustable therewith, said clamps comprising vertical outer members sliding within the frames and horizontal clamping members inwardly extending to engage the pile, and means independently to operate the clamps to clamp the work immediately before the cutting and to release the work immediately after the knives have returned to elevated position.

18. In a paper cutting machine the combination with the main frame and a rotating table thereon, of parallel frame supports arranged on the frame on one side of the center thereof, knife-frames adjustably carried on said supports, knives carried by said frames, means to operate the knives to cut the piles, clamps operating within said frames, said clamps comprising vertical outer members sliding within the frames and horizontal clamping members inwardly extending to engage the pile, means independently to operate the clamps, pile holders to engage and hold the pile under constant tension during its passage through the machine and means automatically to lower the holders on to the pile preparatory to cutting and to release the finished pile.

In testimony whereof we have signed our names to this specification in the presence of two subscribing witnesses.

NIEL GRAY, JR.
DARIUS T. WADHAMS.

Witnesses:
JAS. P. KANE,
PATRICK J. CLANCY.