N. GRAY, JR.

PAPER CUTTING MACHINE.

APPLICATION FILED JULY 20, 1906.

957,553.

Patented May 10, 1910.

3 SHEETS—SHEET 1.

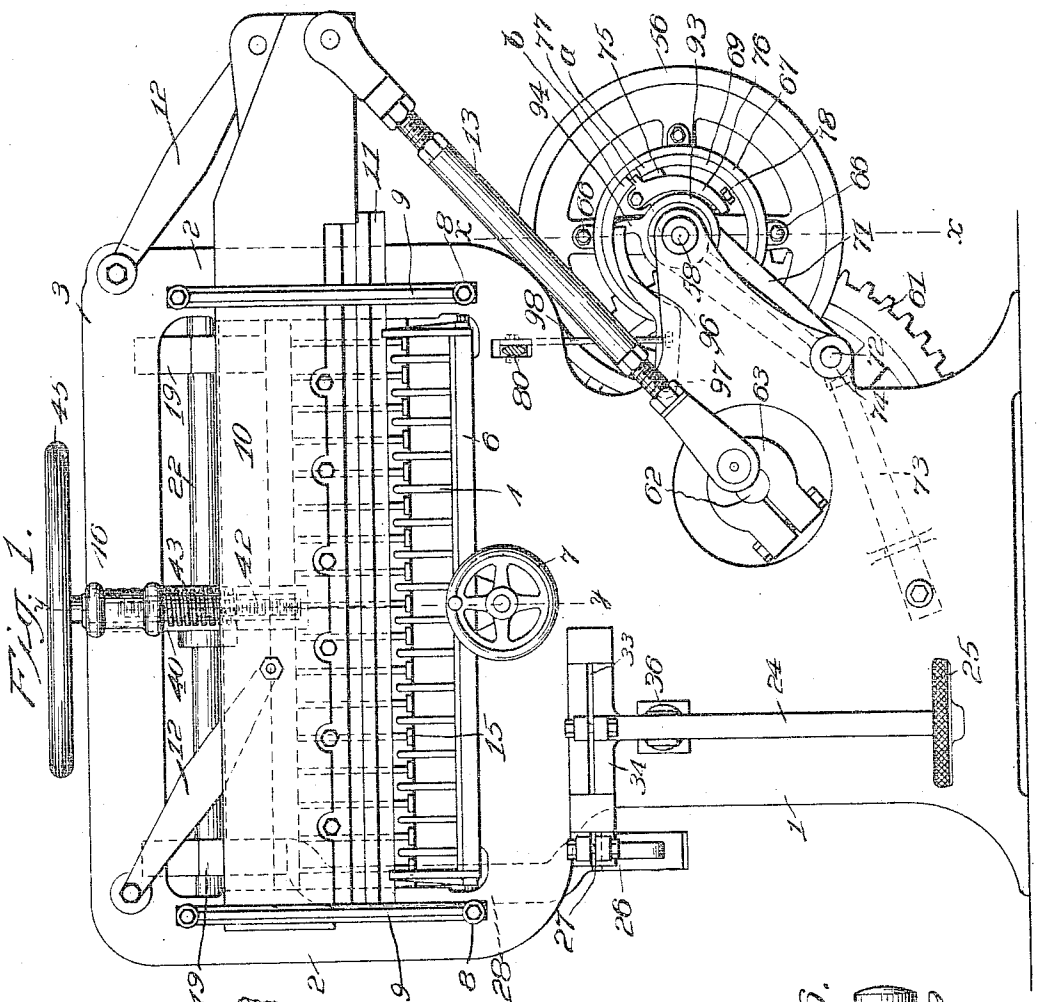

Fig. 1.

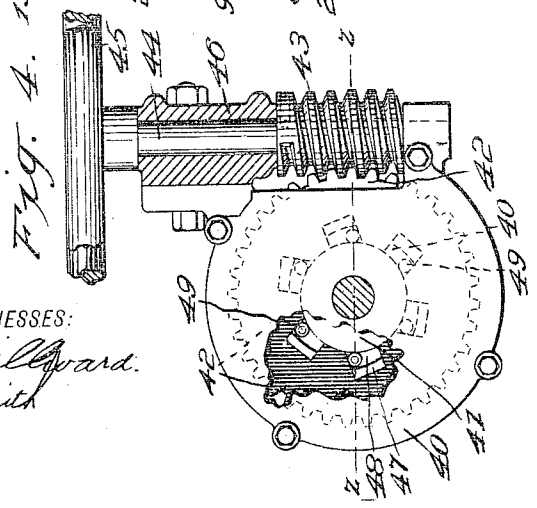

Fig. 4.

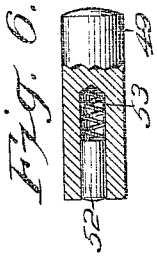

Fig. 6.

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3 SHEETS—SHEET 2.

Fig. 5.

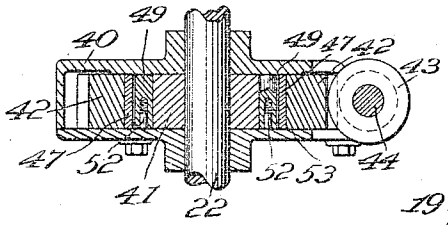
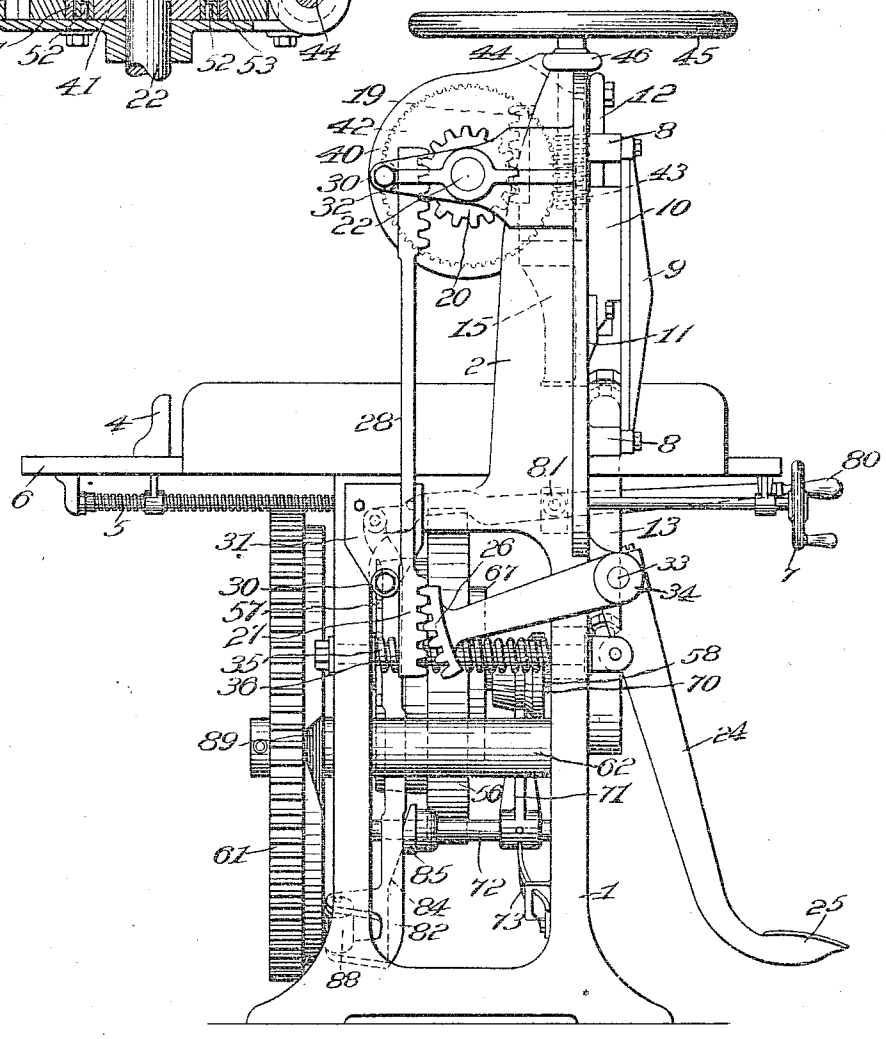


Fig. 2.



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3 SHEETS—SHEET 3.

Fig. 7.

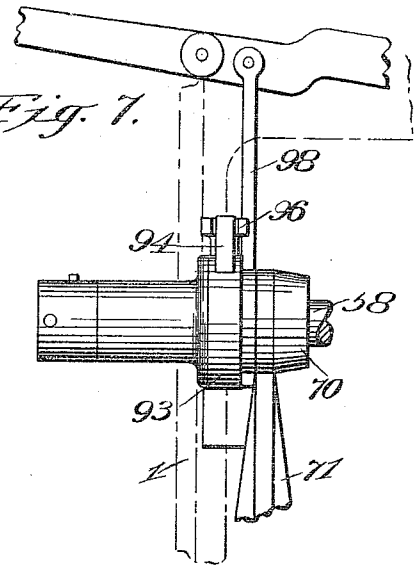


Fig. 8.

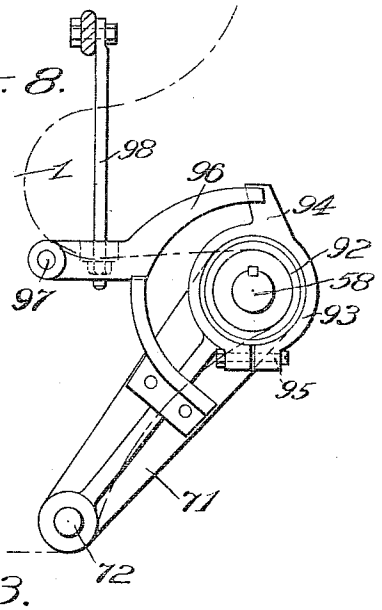
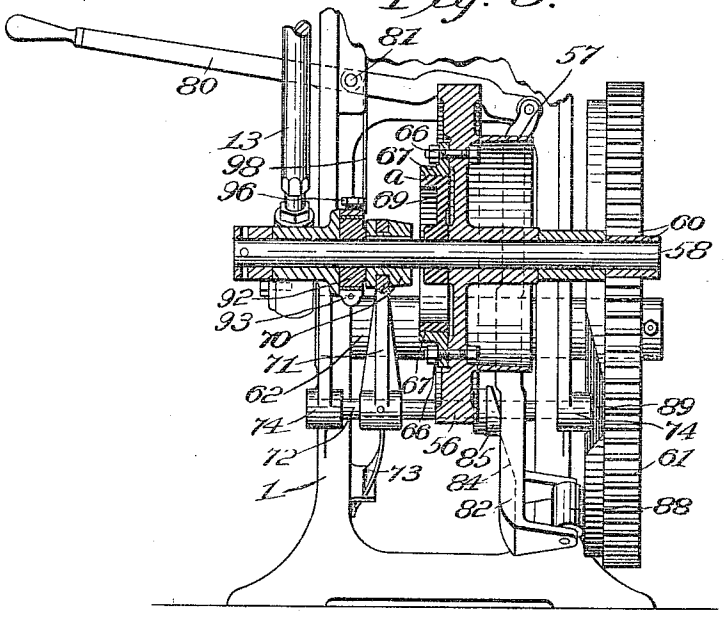


Fig. 3.



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UNITED STATES PATENT OFFICE.

NIEL GRAY, JR., OF OSWEGO, NEW YORK.

PAPER-CUTTING MACHINE.

957,553. Specification of Letters Patent. **Patented May 10, 1910.**

Application filed July 20, 1906. Serial No. 327,063.

To all whom it may concern:

Be it known that I, NIEL GRAY, JR., a citizen 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.

My invention relates to a paper cutting machine and consists in a machine of new construction and mode of operation, whereby the various parts are operated more conveniently and with greater certainty.

The more important features of my invention are a treadle, a system of racks and other connections and a hand operated connection, whereby the clamp is quickly run down onto the paper by the foot and then clamped by hand with a short turn; a simple and effective clutch and coöperating parts, whereby the power is connected to and disconnected from the knife; and a brake for positively and automatically stopping the machine after the cut to prevent an accidental stroke of the knife.

A desirable embodiment of my invention is shown in the drawing herewith, in which the reference characters of the specification indicate the corresponding parts in all the figures.

Figures 1 and 2 are respectively front and left side elevations of the machine. Fig. 3 is a partial vertical section taken on line *x* of Fig. 1. Fig. 4 is a partial vertical section on line *y* of Fig. 1. Fig. 5 is a horizontal cross section on line *z* of Fig. 4. Fig. 6 shows one of the rollers of the clutch of Fig. 4. Figs. 7 and 8 are respectively enlarged side and front elevations of portions of Figs. 1 and 3.

In the figures, 1 indicates the main frame or standard of the machine, which may be made as a single casting having upper extensions 2 2 and an arch 3.

6 is the usual table for the paper-pile and 4 the paper-gage adjustable by screw 5 and wheel 7.

To lugs 8 on the front faces of the extensions are bolted the guide bars 9, forming guide slots for the knife stock 10 and knife 11, supported and operated on the links 12 with a shearing movement, by means of the pitman 13 of adjustable length, connected to the crank on the counter-shaft and by the various operative parts.

The clamp 15 is moved vertically in the extensions by means now to be described and may be fitted thereto by suitable tongues and grooves. The clamp carries near each end a rack 19, meshing with rack gears 20, secured on the clamp-shaft 22, journaled in suitable bearings at the rear of the extensions near their upper ends.

At one side of the machine, the left as here shown, is hung a bell-crank, or treadle, lever 24, having a treadle 25 on its lower arm and a segmental rack 26 on its upper, inwardly extending arm, engaging with a lower rack 27 on the lower end of rack-bar 28, held in position by rollers 30 in brackets 31 32 on the frame. These rollers may be formed with circumferential tongues fitting a vertical tongue on the rack-bar, or the tongue and grooves may be reversed. The arms of the treadle-lever may be secured, as here shown, on opposite ends of treadle-shaft 33 in bearing 34. Connected to the treadle-lever at any convenient point is an expansion spring 35, fitted to guiding studs 36, whereby the clamp is balanced. By this means, when the treadle is depressed by the foot the clamp is brought down on the table, or on the pile of paper, but when the foot is removed, the spring restores the clamp to top position, through the treadle and connections.

At about the center of the clamp shaft 22 is bolted rigidly to the frame the worm-gear case 40, inclosing a hard steel hub 41 keyed on the clamp shaft, and turning freely within a worm-gear 42, meshing with a worm 43 on a worm-shaft 44, carrying the hand-wheel 45 and journaled in a suitable vertical bearing 46. In the inner periphery of the worm-gear are formed cam-slots 48, provided with hardened steel plates 47, for rollers 49, whereby when the treadle is depressed by the foot, the rollers assume the position shown in Fig. 4, and the clamp-shaft and hub turn freely in the worm-gear 42, but when the clamp has so been brought down on the paper pile, the hand-wheel is given a partial turn, whereby the rollers are turned back into the narrow end of their cam slots and the worm-gear is locked to

the hub 41, and the clamp firmly forced down on the pile. Thus the clamp is set down hard on the paper very quickly and conveniently by the use first of the treadle and then of the handle. A short back turn of the hand-wheel releases the rollers and permits the spring to return the clamp to top position.

As best shown in Fig. 6, the rollers may have a pin 52 and spring 53 fitting a socket in one end to produce a slight friction on the sides of the gear case, causing the rollers to drag. Each roller and pin is preferably formed with a rounded end to engage with the gear case, to act as a friction pivot around which the roller rotates.

Referring to Figs. 3, 7 and 8 in connection with Fig. 1, for the construction of the driving mechanism, the knife clutch and brake—the fly wheel 56 and pulley 57—are operated continuously from any suitable source of power, while the driving shaft 58 is stationary, except when connected thereto to operate the knife. On the end of said driving shaft is a pinion 60 meshing with main knife gear 61 on counter-shaft 62, carrying crank-wheel 63, connected to the knife-stock by pitman 13. To the fly wheel 56 is bolted by bolts 66 the clutch-ring, or outer clutch member, 67, turning freely on the driving-shaft 58, except when locked thereto by clutch band-spring, or inner clutch member, 69, which is expanded frictionally to engage with the clutch-ring by the operation of cone 70, sliding on the driving shaft but connected to turn therewith, which is moved back (to the right as shown in Fig. 3) by means of shifter-yoke 71, fixed on shifter-rod 72, moved in bearings 74 into engaging position by the operation of a flat spring 73, or other similar means. The clutch spring 69 is fixed at end *a* on its supporting hub 75 but free at end *b*. A curved lever 76, hung on said supporting hub 75, has a stud 77 engaging with said free end *b* and an adjustable set-screw 78 on its free, lower end to engage with the sliding cone 70, whereby when the cone is shifted, the clutch-spring 69 is expanded and forced out into frictional engagement with clutch ring 67, the driving-shaft is connected to the pulley, and the knife is operated.

The spring 73 is free to shift the shifter-rod and the cone only when the starting handle 80 is depressed by the following arrangement of parts. When said handle, pivoted at point 81, is depressed, the stop-wedge 82, hung on the rear end of the handle lever, is raised, bringing the incline 84 into alinement with the stop-wedge collar 95 on the shifting rod, having a similar incline, permitting the cone and the clutch to be shifted gradually, but quickly, into engaging position by the spring 73.

Automatically, to stop the operation of the knife, a rear projection, preferably in the form of an antifriction roller 88, is arranged on the lower end of the stop-wedge and engaging with the front face of the main gear 61. A cam notch 89 is formed in said front face at a point where it will come into alinement with said roller, when the knife has nearly reached the top of its up return stroke. The lower end of the stop-wedge then swings outwardly into the notch, and instantly drops therein by its own weight, raising the handle to its original position. As the main gear continues to revolve, the stop-wedge roller having arrived in such low position, whereby the incline 84 is below the line of the stop-wedge collar 85, is forced forward, or out of the notch 89 onto the high, or plane, surface of the main gear, thus forcing the stop-wedge, shifting-rod and yoke into initial position, whereby the clutch is released and the knife stopped.

Positively to insure the stopping of the machine and the danger of an accidental return of the knife (see Figs. 7 and 8), a friction brake is provided to stop the rotation of the driving-shaft 58. On said shaft is secured a brake-collar 92. A friction ring 93, preferably fiber lined, and having a projecting lug 94, is arranged to encircle said brake-collar and is preferably split and provided with a pinch bolt 95 to regulate its friction on the brake collar. A brake-lever 96, pivotally supported at 97, and connected to the hand-lever by connection 98 is initially in the path of said lug. When the hand-lever is depressed and the stop-wedge raised, said brake-lever is raised out of the path of the lug and the brake-collar and the friction-ring revolve freely as one, but when the hand-lever is returned to its initial position by the means aforesaid, the brake-lever drops and engages with the lug, stopping the friction-ring, and thus applying a friction-brake to the driving-shaft, and positively stopping the knife.

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

1. In a paper cutting machine, the combination with a suitable frame and paper supporting table, of the paper clamp fitted to slide between the upper extensions of the frame, racks on the rear face of the clamp, a horizontal clamp-shaft journaled on the frame, gears secured on said shaft and meshing with said racks, a bell-crank lever supported in a journal bearing on the frame and having a downwardly extending, front arm and a rearwardly extending, upper arm, a treadle on said lower arm, a segmental-rack on said upper arm, a vertically arranged rack-bar having an upper rack meshing with one of said gears and a lower rack meshing

with said segmental-rack, a hub secured on the clamp-shaft, a worm-gear fitting around the hub and having cam slots formed between its inner periphery and the periphery of the hub, a worm-gear case secured on the frame and inclosing the worm-gear, rollers arranged in the cam slots to bind therein and lock the worm-gear to the hub when the worm is turned in the direction to rotate the clamp-shaft to depress the clamp, a vertical bearing on the front of the frame, a worm-shaft in said bearing, a hand-wheel in the upper end of said shaft, and a worm on the lower end of said shaft meshing with the worm-gear, substantially as described and shown.

2. In a paper cutting machine, the combination with a suitable frame and paper supporting table, of the paper clamp fitted to slide between the upper extensions of the frame, racks on the rear face of the clamp, a horizontal clamp-shaft journaled on the upper portion of the frame, gears secured on said shaft and meshing with said racks, a bell-crank lever having a treadle on its downwardly extending front arm and a segmental-rack on its rearwardly extending upper arm, a spring to return the bell-crank lever to initial position, a vertically arranged rack-bar having an upper rack meshing with one of said gears and a lower rack meshing with said segmental-rack, means to maintain said rack-bar in vertical or operative position, a hard steel hub secured on the clamp-shaft about at its center, a worm-gear having its inner periphery fitting the hub and cam slots formed in said inner periphery, a worm-gear case bolted on the rear of the frame and inclosing the worm-gear, rollers arranged in the cam slots to bind therein and lock the worm-gear to the hub when the worm-gear is turned in the direction to rotate the clamp-shaft to depress the clamp, a pin and spring fitted to a socket in one end of each roller, each pin and the opposite end of each roller being formed with rounded ends to form pivotal bearings, a worm-shaft supported on the frame, a hand-wheel on said worm-shaft, and a worm on said worm-shaft meshing with the worm-gear, substantially as described and shown.

3. In a paper cutting machine, the combination with a suitable frame and paper supporting table, of the paper clamp fitted to slide between the upper extensions of the frame, racks on the rear face of the clamp, a horizontal clamp-shaft journaled in rear bearings on the upper ends of said extensions, gears secured on said shaft and meshing with said racks; a bell-crank lever composed of a lever shaft journaled in a bearing on the front of the machine at one side, of a downwardly extending, front arm fixed on the inner end of the lever shaft and of a rearwardly extending, upper arm fixed on the outer end of the lever shaft, a treadle on said lower arm, a segmental-rack on said upper arm, a spring supported on the frame and engaging with said front arm to return the segmental-rack to initial or lower position, a vertically arranged rack-bar having an upper rack meshing with one of said gears and a lower rack meshing with said segmental-rack, upper and lower brackets on the rear of the frame, rollers in said brackets to engage with the rack-bar to maintain it in position, a hard steel hub secured on the clamp-shaft at its center, a worm-gear having its inner periphery fitting the hub and cam slots formed in said inner periphery, a worm-gear case bolted on the rear of the frame and inclosing the worm-gear, rollers arranged in the cam slots to bind therein and lock the worm-gear to the hub when the worm-gear is turned in the direction to rotate the clamp-shaft to depress the clamp, a pin and spring fitted to a socket in one end of each roller, frictionally to engage with the faces of the gear case, each pin and the opposite end of each roller being formed with rounded ends to form pivotal bearings, a vertical bearing on the front of the frame, a worm-shaft in said bearing, a hand-wheel in the upper end of said shaft, and a worm on the lower end of said shaft meshing with the worm-gear, substantially as described and shown.

4. In a paper cutting machine, the main frame, the knife-stock and knife fitted to the frame, links supporting the knife, a counter-shaft, a crank on said counter-shaft, a pitman connecting the crank to the knife-stock, a driving-shaft, a pinion on the driving-shaft, a main gear on the counter-shaft meshing with said pinion, a fly-wheel and pulley fitted to turn on the driving-shaft, means to rotate the fly-wheel and pulley and in combination therewith an outer clutch member secured on the fly-wheel, an inner clutch member on the driving-shaft, a cone fitted to slide on and to turn with the driving-shaft, a shifter-rod supported in bearings on the frame, a shifter-yoke secured on said rod and engaging with said cone, a spring tending to move said rod and cone toward the clutch to force the inner clutch member into engagement with the outer member, a starting-lever pivotally supported on the frame, a stop-wedge having an incline hung on the rear of the lever, a stop-wedge collar fixed on the shifter-rod and having a corresponding incline and a rear projection on the stop-wedge adapted to enter a cam-notch on the front of the main gear when the knife is nearly at the top of its return stroke.

5. In a paper cutting machine, the main frame, the knife-stock and knife fitted to the

frame, links supporting the knife, a counter-shaft, a crank on said counter-shaft, a pitman connecting the crank to the knife-stock, a driving-shaft, a pinion on the driving-shaft, a main gear on the counter-shaft meshing with said pinion, a fly-wheel and pulley fitted to turn on the driving-shaft, means to rotate the fly-wheel and pulley and in combination therewith a clutch ring secured on the fly-wheel, a hub secured on the driving-shaft, an expansible band-spring arranged within the clutch ring and having one free end and one end secured on said hub, a curved lever hung on said hub and having a stud to engage with the free end of said band spring and its free end adapted to engage with a cone sliding on the driving-shaft, said cone fitted to turn with the driving-shaft, a shifter-rod supported in bearings on the frame parallel to the driving shaft, a shifter-yoke secured on said rod and engaging with the cone, a spring to force the yoke and cone toward the clutch ring to expand the band-spring, a starting handle pivotally supported on the frame, a stop-wedge having an incline hung on the rear end of the handle lever, a stop-wedge collar fixed on the shifter-rod and having a corresponding incline, and a projection on the stop-wedge adapted to enter a cam-notch on the front of the main gear when the knife is nearly at the top of its return stroke, substantially as described and shown.

6. In a paper cutting machine, the combination with a suitable frame, of the knife supported thereon, a driving-shaft, operative connections between the said shaft and knife, a power wheel, or pulley, turning freely on the shaft, a clutch to connect said wheel to the shaft when the knife is to be operated, a starting lever to operate said clutch, a brake collar on the driving-shaft having a fiber surface, a split ring encircling said brake-collar, a pinch bolt to regulate the friction of the split ring on the collar, a projecting lug on the split ring, a brake lever hung on the frame and normally in the path of the said lug, and a connection from the brake-lever to the starting-lever to raise the brake-lever out of the path of the lug when the lever is depressed to put the knife into operation, substantially as described and shown.

7. In a paper cutting machine, the combination with a suitable frame, of the knife supported thereon, a driving-shaft journaled in the frame, operative connections between said shaft and knife, a power wheel turning freely on the shaft, a clutch to connect the wheel to the shaft when the knife is to be operated, a starting-lever to operate the clutch, a brake-collar on the driving-shaft, a ring surrounding said collar and in frictional engagement therewith, a projecting lug on the ring, a brake-lever hung on the frame normally in the path of the lug, and a connection between the brake-lever and the starting-lever to raise the brake-lever out of the path of the lug when the lever is depressed to put the knife into operation.

8. In a paper cutting machine, the main frame, the knife-stock and knife fitted to the frame, links supporting the knife, a counter-shaft suitably journaled, a crank on said counter-shaft, a pitman connecting the crank to the knife-stock, a driving-shaft suitably journaled parallel to the counter-shaft, a pinion on the driving-shaft, a main gear on the counter-shaft in mesh with said pinion, a fly-wheel and pulley fitted to turn on the driving-shaft, means to rotate the fly-wheel and pulley, and in combination therewith a clutch ring secured on the fly-wheel, a hub secured on the driving-shaft, an expansible band-spring arranged within the clutch ring and having one free end and one end secured on said hub, a curved lever hung on said hub and having a stud to engage with the free end of said band-spring and an adjustable set-screw at its free end to engage with a cone sliding on the driving-shaft, said cone fitted to turn with the driving-shaft, a shifter-rod supported in bearings on the frame parallel to the driving-shaft, a shifter-yoke secured on said rod and having a forked end engaging with an annular groove in the cone, a spring tending to force the yoke and cone toward the clutch ring to expand the band-spring, a starting-lever pivotally supported on the frame, a stop-wedge having an incline hung on the rear end of the starting-lever, a stop-wedge collar fixed on the shifter-rod and having a corresponding incline, a rearwardly projecting antifriction roller on the lower end of the stop-wedge adapted to enter a cam-notch on the front of the main gear when the knife is nearly at the top of its return stroke, a brake-collar on the driving-shaft having a fiber surface, a split ring encircling said brake-collar, a pinch bolt to regulate the friction of the split ring on the collar, a projecting lug on the split ring, a brake lever hung on the frame and normally in the path of the said lug and a connection from the brake-lever to the starting-lever to raise the brake-lever out of the path of the lug when the lever is depressed to put the knife into operation, substantially as described and shown.

9. In a paper cutting machine, the combination with a suitable frame and a paper supporting table, of a paper clamp suitably arranged, a bell-crank lever suitably journaled and having a downwardly extending front arm and a rearwardly extending upper arm, a treadle on said lower arm, a clamp shaft, connections between the clamp shaft

and the clamp whereby the clamp may be depressed by the rotation of the shaft, connections between the upper arm of the bell-crank lever and the clamp shaft whereby the clamp shaft is rotated to lower the clamp upon the depression of the treadle, a hub secured on the clamp shaft, a worm gear fitting around the hub and having cam-slots formed between its inner periphery and the periphery of the hub, a worm gear case secured on the frame and inclosing the worm-gear, rollers arranged in the cam slots to bind therein and lock the worm gear to the hub when the worm gear is turned in the direction to rotate the clamp shaft to depress the clamp, a worm-shaft suitably journaled, a hand wheel on said shaft and a worm on said shaft meshing with the worm gear.

10. In a paper cutting machine, the main frame, the knife-stock and knife fitted to the frame, a counter-shaft, connections between the counter-shaft and the knife-stock whereby the knife is operated on the rotation of the counter-shaft, a driving-shaft, connections between the counter-shaft and the driving-shaft, a pulley journaled on the driving shaft, a clutch member secured to the pulley, a cone operated second clutch member secured to the driving shaft and adapted to be forced into frictional engagement with the first clutch member by the cone, a cone slidably arranged on the driving shaft, a shifter-yoke suitably arranged and adapted to move the cone into and out of operative position, a spring tending to operate the shifter-yoke to move the cone into operative position, to force the clutch-members into engagement, a starting-lever pivotally supported on the frame, a stop wedge hung on the rear of the lever, said wedge being arranged to hold the shifter yoke inoperative against the tendency of the shifter-spring when in normal lower position, and to permit the shifting of the yoke by the spring when elevated by the starting lever and means to permit the stop-wedge to drop into lower position immediately after the operation of the knife and means then operative to return the said wedge to its normal position against the tension of the spring to throw the cone out of engagement.

11. In a paper cutting machine, the combination with a suitable frame and paper supporting table, of the paper clamp, a clamp-shaft, connections between the clamp-shaft and the clamp to operate the clamp upon the rotation of the shaft, means to depress the clamp, a hub secured on the clamp shaft, a manually operated member fitting around the hub and provided with cam slots on its inner periphery, a stationary case inclosing said member and rollers interposed between said hub and member within said slots to bind therein and lock the member to the hub when rotated in the direction to cause depression of the clamp.

12. In a paper cutting machine, the combination with a suitable frame and paper supporting table, of the paper clamp, a clamp-shaft, connections between the clamp-shaft and the clamp to operate the clamp on the rotation of the clamp-shaft, means automatically to rotate said shaft to depress the clamp, a hub secured on the clamp-shaft, an operating gear fitting around the hub and provided with cam slots on its inner periphery, a stationary case inclosing said hub and gear, rollers interposed between said hub and gear within said slots to bind therein to lock the gear to the hub when rotated in the direction to cause depression of the clamp, a pin and spring fitted to a socket in the end of each roller whereby the rollers are caused to engage at either end with the inclosing case, and manually operated means to rotate said gear whereby the clamp is depressed.

13. In a paper cutting machine, the combination with the frame and the knife, of a driving shaft, connections between the driving shaft and the knife to operate the knife, a driven member, a clutch adapted to couple the driven member to the drive-shaft to operate the knife, clutch operating means normally tending to throw the clutch into operative engagement, an engaging element rotatably connected to the drive-shaft and provided with an elevated and a depressed portion, a stop-wedge interposed in position to be actuated by the elevated portion to disengage the clutch from operative engagement, a starting lever connected to the wedge whereby the wedge is withdrawn to permit the engagement of the clutch, said stop-wedge being arranged to be held in inoperative position during the engagement of the elevated portion and to return to its operative position by engagement with the depressed portion whereby the drive-shaft will be disconnected upon reëngagement with the elevated portion.

14. In a paper cutting machine, the combination with the frame and the knife, of a driving shaft, connections between the driving shaft and the knife to operate the knife, a driven member, a clutch adapted to couple the driven member to the drive-shaft to operate the knife, clutch operating means normally tending to throw the clutch into operative engagement, means to disconnect the clutch at the end of each stroke comprising a stop-wedge normally in a position when actuated to disconnect the clutch from operative engagement, means to actuate the stop wedge at the end of each stroke, a starting lever, connections between the starting

lever and the stop-wedge to withdraw said wedge from operative position to permit engagement of the clutch, said wedge being permitted to return to its initial position immediately before the end of the knife stroke, a brake member fixed to the drive-shaft, a journaled brake member in frictional engagement with the brake member, a lug on the journaled member and a pivotal arm arranged in the path of the lug and connections between said arm and the starting lever to withdraw said arm from the path of the lug.

In testimony whereof I have signed my name to this specification in the presence of two subscribing witnesses.

NIEL GRAY, JR.

Witnesses:
W. H. TEST,
JENNIE H. WILCOX.