(No Model.) 2 Sheets—Sheet 1.

W. LIDDELL.

PERFORATING AND CUTTING MACHINE.

No. 492,871. Patented Mar. 7, 1893.

Fig. 1

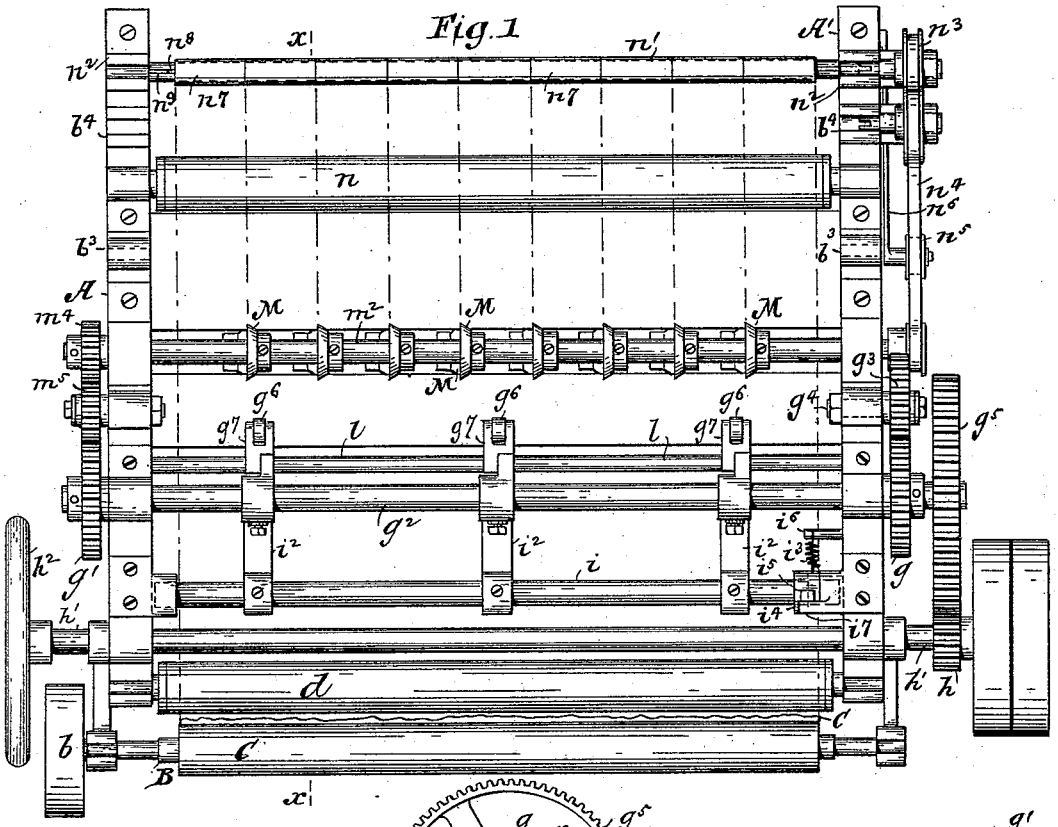


Fig. 2

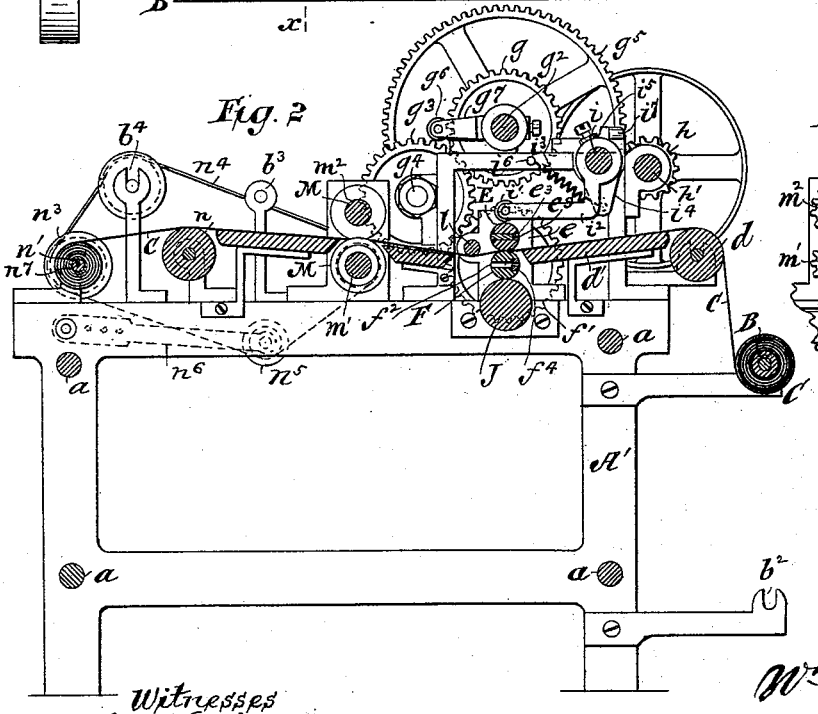
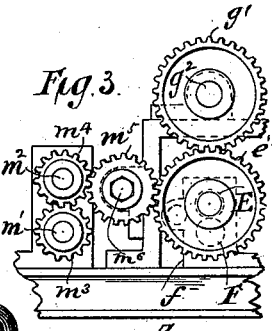


Fig. 3.



Witnesses
Geo. Wadman
Samuel Crowe

Inventor
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(No Model.) 2 Sheets—Sheet 2.

W. LIDDELL.

PERFORATING AND CUTTING MACHINE.

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Fig. 4

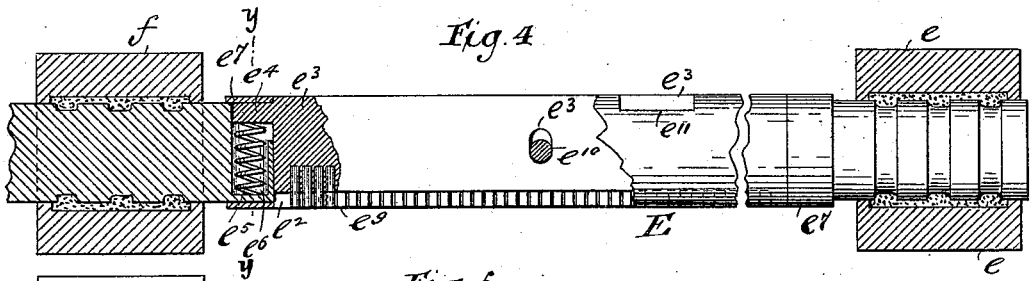


Fig 5

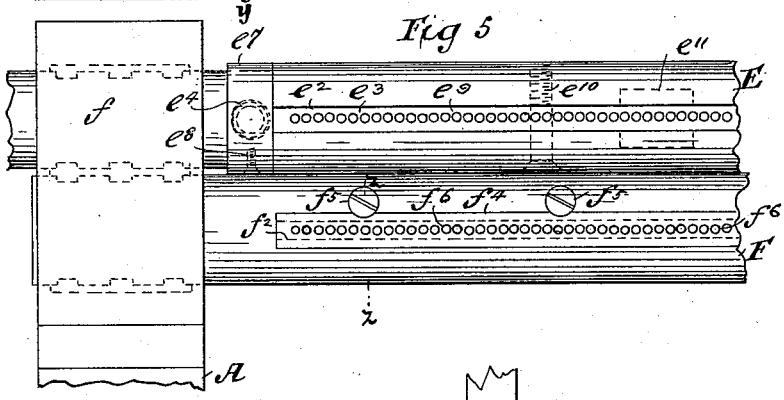


Fig6

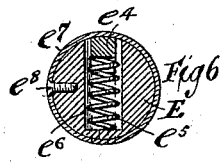


Fig.7

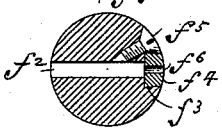


Fig.8

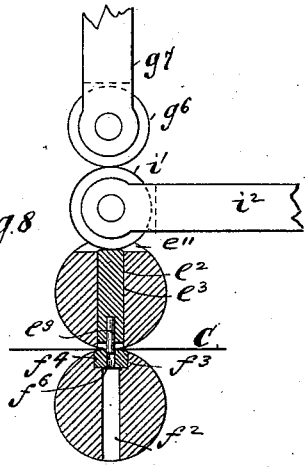
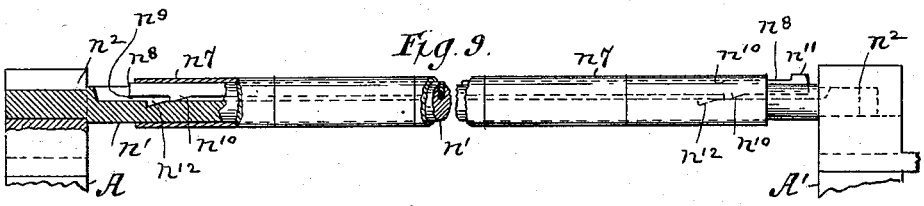


Fig. 9.



Witnesses
Geo. Wadman
Samuel Crowe

Inventor
Wm Liddell

UNITED STATES PATENT OFFICE.

WILLIAM LIDDELL, OF BROOKLYN, NEW YORK.

PERFORATING AND CUTTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 492,871, dated March 7, 1893.

Application filed June 13, 1892. Serial No. 436,614. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM LIDDELL, a citizen of the United States, and a resident of Brooklyn, county of Kings, and State of New York, have invented a new and useful Improvement in Perforating and Cutting Machines, of which the following is a specification.

My invention relates more particularly to machines for producing toilet paper in rolls and consists in the novel construction and arrangement of punches and dies for perforating the same and other mechanism acting in conjunction therewith.

In the accompanying drawings Figure 1 is a top plan view of a machine embodying my improvements. Fig. 2 is a vertical section taken at the plane of the line *x x* Fig. 1. Fig. 3 is a side elevation of a portion of the machine. Fig. 4 is a view partly in section of portions of a feed roller containing a row of punches mounted to slide therein and showing a sectional plan view of the bearings therefor. Fig. 5 is an elevation taken transversely of the machine and showing portions of the feed rollers. Fig. 6 is a cross section at the line *y y* Fig. 4. Fig. 7 is a cross section at the line *z z* Fig. 5. Fig. 8 is a sectional view of the feed rollers and showing other parts. Fig. 9 is a view partly in section of a take up roller and showing tubes on which paper is to be wound, clamped thereto.

A A′ designate the side frames of the machine secured together by cross bars *a*.

B is a delivery roller on which is secured a roll of paper C to be fed into the machine and cut and perforated to form rolls of toilet paper. This roller is provided with a pulley *b* on which a weighted brake strap may rest. The paper is led over a guide roller *d* and table support *d′* to a pair of feed rollers E and F constructed to punch at each revolution, a row of holes crosswise of the paper. These rollers are journaled in boxes *e*, *f* secured to the side frames A A′ and may have their journal ends constructed as shown in Figs. 4 and 5 to prevent longitudinal movement in the bearings.

Motion is imparted to the rollers E and F by means of gear wheels *g*. *g′* secured on a shaft g^2. The wheel *g′* engages with a wheel *e′* secured to the upper feed roller E as shown in Fig. 3 and the wheel *g* engages with a wheel *f′*, secured to the lower feed roller F, through an intermediate wheel g^3 mounted on a stud g^4 as shown in Fig. 2. The shaft g^2 has a wheel g^5 affixed thereto engaging with a pinion *h* secured to a driving shaft *h′* provided with a fast and loose pulley and a band wheel h^2. The upper roller E is provided with a slot e^2 extending approximately its entire length between its bearings.

e^3 is a bar fitted to slide freely within the slot e^2 and is provided at each end with an extension e^4 projecting beyond the slot e^2 and acted on by a coil spring e^5 resting in a cavity e^6 formed in the roller E.

e^7 is a collar, affixed to each end portion of the roller E by a screw e^8, to inclose the projecting ends of the bar e^3 and to serve as a stop therefor when one edge of the bar e^3 coincides with the circumference of the roller.

e^9 is a row of punches secured in sockets in the bar e^3 and held normally with their faces within the circumference of the roller as in Fig. 4.

e^{10} is a screw, of which there may be two or more, passing through slots in the bar e^3 to secure the two side portions of the roller E from springing apart.

The roller F contains a slot f^2 and recess f^3 extending approximately its entire length between its bearings. The recess f^3 forms a seat for a die plate f^4 the latter being secured in position by means of screws f^5 arranged along one side. If desired the opposite side of the die plate may be slightly dovetailed within the recess f^3. This die plate is provided with a row of holes f^6 to receive the punches e^9 when the latter are in line therewith during each revolution of the feed rollers. The slot f^2 affords an outlet for the punched out portions or refuse of the paper. The punches e^9 are forced into the holes f^6 of the die plate f^4 by means of antifriction rollers g^6 carried by radially adjustable arms g^7 secured to the shaft g^2. These rollers g^6 come in contact in the course of a revolution of the

shaft g^2 with similar rollers i' carried by arms i^2 secured to a rock-shaft i. The rollers i' are held in a position normally slightly above the surface of the feed roller E by means of a spring i^3 connecting an arm i^4, secured to the shaft i, to a stud i^6 and tending to hold a lug i^5 of the arm i^4 against a stationary stop i^7. These rollers i' when rocked downward by the arms g^7 depress the bar e^3 and cause the punches to perforate the paper.

e'' denotes notched portions of the roller E to admit of the rollers i' acting on the bar e^3. As the radial distance between the actuating rollers g^6 and their axis of rotation is considerably greater than that between the punches and die holes and their axis of rotation, the difference in circumferential speed enables the rollers g^6 to operate the punches instantly and during a very slight movement of the feed rollers.

J is a roller journaled in the side frames and serves to support the roller F when subjected to pressure during the action of the punches. After being perforated the paper is drawn beneath a roller l, which strips it from the punches e^9 and from thence between pairs of rotary disk-shaped knives M adjustably secured on shafts m' m^2 and which cut the paper into continuous strips of suitable width as indicated by dotted lines in Fig. 1. The shafts m' m^2 are geared together by pinions m^3 m^4 and derive motion from the wheel e' through an intermediate wheel m^5 mounted on a stud m^6 as shown in Fig. 3. The paper is then drawn over a guide roller n by a take-up roller n' which is journaled in open bearings n^2 and connected at one end by a tenon and groove to the shaft of a pulley n^3. This pulley is rotated from the shaft m' by a belt n^4 upon which rests a pulley n^5 carried by a swinging arm n^6 whereby the requisite tension is obtained.

The roller n' is provided with a clamping device for securing thereto paper tubes n^7, upon which are wound the several strips of paper, and which form a part of the roll. This clamping device is shown in Fig. 9 and consists of a bar n^8 fitted to slide in a groove n^9 and provided with wedge-shaped projections n^{10} occupying recesses n^{12} in the groove n^9. On sliding this bar by a head portion n'' it is caused to move outwardly and bear against the tubes n^7 thereby clamping each to the roller. When the rolls of paper are complete they are loosened after the take-up roller has been removed from the machine, and allowed to slide therefrom into a receptacle.

If desired two or more rolls of paper may be passed through the machine simultaneously. I have shown a bearing b^2 for receiving an additional delivery roller and also bearings b^3 b^4 for a take up roller and guide roller for the same.

The paper may be fed toward the punch and die rollers by an independent pair of feed rollers if preferred, and arranged immediately in front of the former.

I claim—

1. The combination in a perforating machine of a pair of longitudinally slotted rollers mounted to turn in unison and between which paper to be perforated is fed, the slot of one of the said rollers having a bar, containing a row of punches, fitted to slide therein transversely of the roller, and the slot of the other roller having a die plate secured therein and provided with holes to receive the said punches when in alignment therewith, springs arranged to actuate the slide bar in one direction to disengage the punches from the holes of the die plate after use, rollers journaled in the arms of a rock shaft and normally sustained in a position to be rocked against the said slide bar to operate the punches, and other rollers arranged for rocking the last mentioned rollers, journaled in arms of a rotary shaft, and having comparatively a much greater circumferential velocity around the latter than that of the roller carrying the punches, around its axis of motion, substantially as described.

2. In a perforating machine the combination of the shaft g^2 having radially adjustable arms g^7 carrying rollers g^6, the rock shaft i having arms i^2 carrying rollers i', the roller E containing a sliding bar having a row of punches secured thereto and operated by the rollers g^6 through the rollers i' the roller F containing a die plate provided with holes to receive the said punches and opening into a slot extending through the same, the gear wheels g g' secured to the shaft g^2 and respectively operating the rollers E and F through the gear wheels e' and f' g^3, and the main driving shaft h' imparting motion to the shaft g^2 through the wheel g^5 and pinion h substantially as described.

3. In a perforating machine as described the roller E having a slide bar e^3 containing a row of punches e^9 fitted to slide in a slot therein the bar e^3 having end extensions e^4 inclosed by collars secured to the roller and acted on by coil springs arranged in sockets formed in the roller whereby one edge of the bar e^3 is held normally to coincide with the circumference of the roller and its punches held within the circumference thereof substantially as described.

4. In combination the feed rollers E F, one having a slide bar containing a row of punches arranged to enter a row of holes in a die plate secured within the other roller when in alignment with the holes, mechanism as described for rotating the feed rollers and operating the punches into and out of engagement with the holes of the die plate, a roller support as J for the roller F, pairs of rotary cutting disks adjustably secured to shafts arranged one above the other, a take-up roller detachably connected to the shaft of a driving pulley and provided with means for

clamping thereto tubes on which paper may be wound and an adjustable tension device for regulating the strain on the paper while being wound on the take-up roller substantially as described.

In testimony that I claim the foregoing as my invention I have signed my name, in presence of two witnesses, this 8th day of June, 1892.

WM. LIDDELL.

Witnesses:
GEO. WADMAN,
JOHN HOLZKAMP.