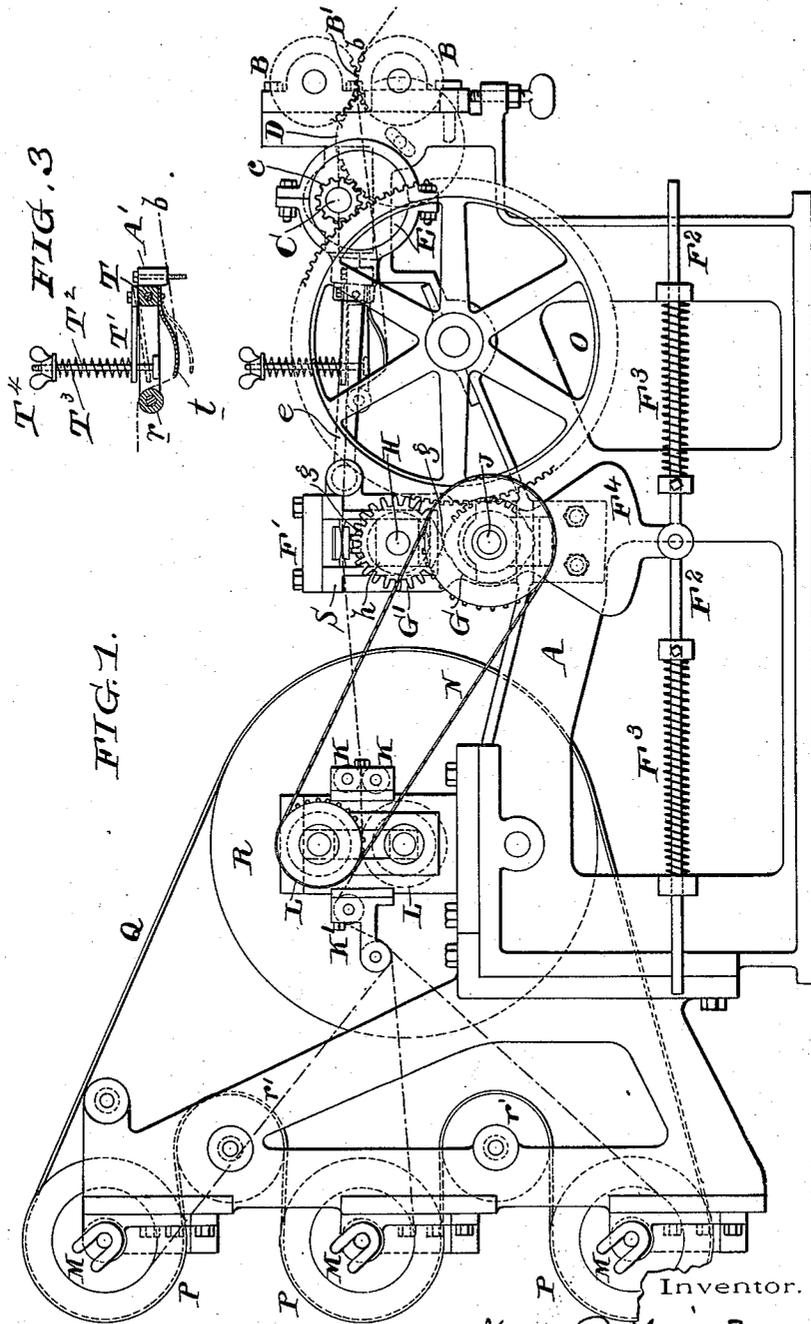


H. P. FEISTER.  
TOILET PAPER PERFORATING MACHINE.

No. 567,460.

Patented Sept. 8, 1896.



Witnesses.

*Henry Denny*  
*R. M. Kelly*

Inventor.

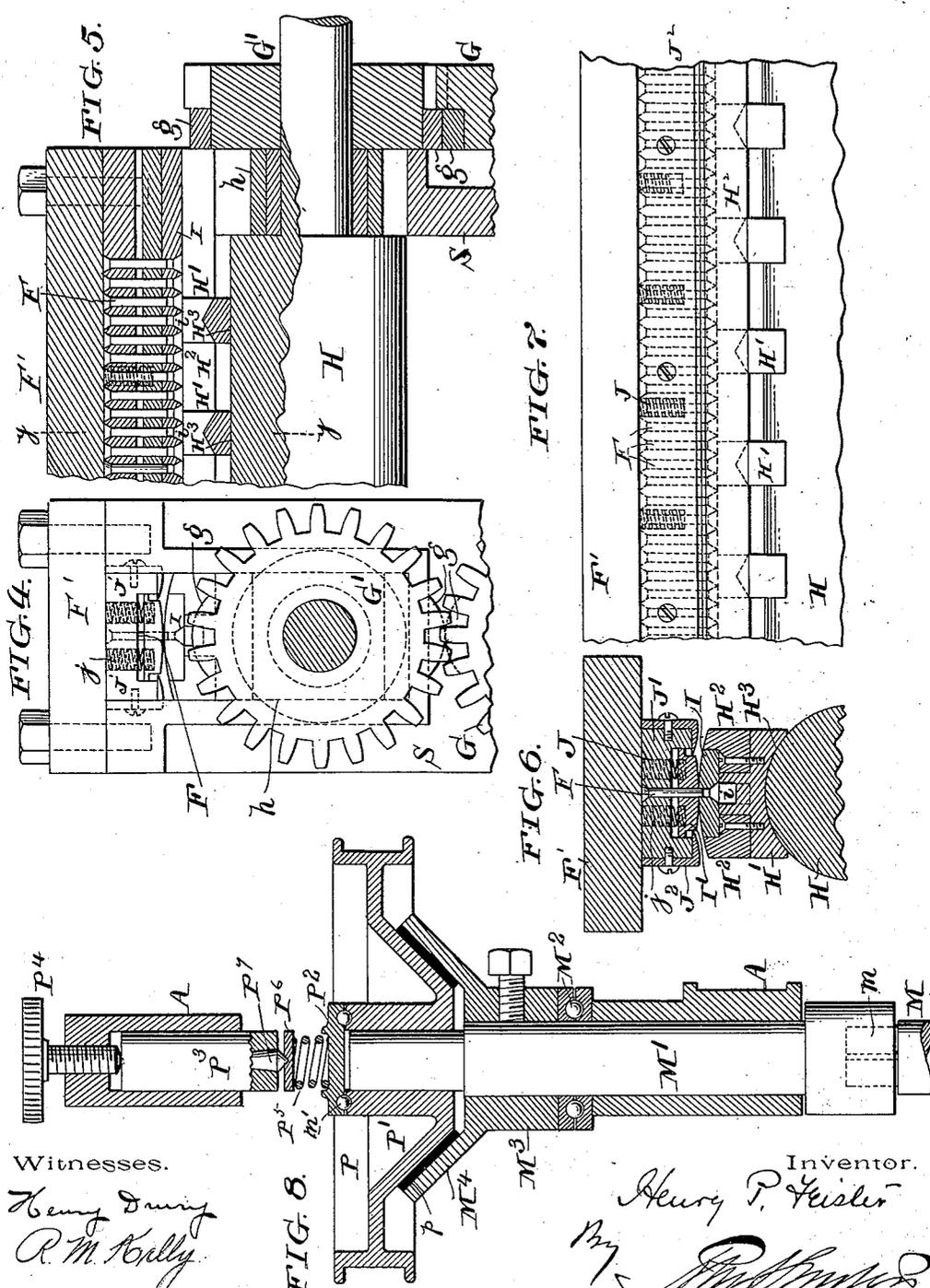
*Henry P. Feister*  
By *[Signature]*  
Attorney.



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*Henry Dunning*  
*R. M. Kelly*

Inventor.  
*Henry P. Feister*  
*My*  
*Attorney*  
 Attorney.

# UNITED STATES PATENT OFFICE.

HENRY P. FEISTER, OF PHILADELPHIA, PENNSYLVANIA.

## TOILET-PAPER-PERFORATING MACHINE.

SPECIFICATION forming part of Letters Patent No. 567,460, dated September 8, 1896.

Application filed October 29, 1895. Serial No. 567,252. (No model.)

*To all whom it may concern:*

Be it known that I, HENRY P. FEISTER, of the city and county of Philadelphia and State of Pennsylvania, have invented an Improvement in Toilet-Paper-Perforating Machines, of which the following is a specification.

My invention has reference to toilet-paper-perforating machines; and it consists of certain improvements which are fully set forth in the following specification and shown in the accompanying drawings.

The object of my invention is to produce a machine adapted to produce transverse perforations in a web of paper, and, if desired, also to subdivide it into sheets of less width at the same time, the construction being adapted to produce the said results in a rapid, continuous, and perfect manner.

My object is to provide a specific construction of perforating or punching devices which shall insure a clean cut by the punches and dies, securing thereby all the advantages due to that class of machines employing an intermittent feed and stationary punches.

My invention comprehends certain details of construction which will be better understood by reference to the accompanying drawings, in which—

Figure 1 is a side elevation of my improved perforating-machine. Fig. 2 is a plan view of same. Fig. 3 is a cross-section of a portion of same on line *xx*. Fig. 4 is an end elevation of a portion of the perforating devices. Fig. 5 is a vertical sectional elevation thereof. Fig. 6 is a transverse sectional elevation of Fig. 5 on line *yy*. Fig. 7 is a front elevation of a portion of the perforating devices, and Fig. 8 is a sectional front view of one of the friction driving devices for the winding-spindles.

A is the main frame of the machine.

B B are two feeding-rolls for feeding the web of paper *b* through the machine. These rolls are geared together by spur-gears B', so as to positively rotate in unison. They are driven from the power-shaft C by means of a pinion *c'* and spur-wheels D D'. By changing the size of the spur-wheel D' and adjusting the spur-wheel D the feeding-rolls may be driven at different speeds.

S is a frame pivoted upon the shaft *j* and made to oscillate thereon. This frame is normally held in a vertical position by the

rods F<sup>2</sup> and springs F<sup>3</sup>. It is more or less counterbalanced by the weight F<sup>4</sup>, arranged below the pivoted shaft *j*. This frame carries the perforating devices, to be presently described. In the operation of the machine the frame S is oscillated by means of eccentrics E on the shaft C and the connecting or eccentric rods *e*. Arranged transversely in bearings *h* is a shaft H. The bearings *h* are guided in the frame S and may rise and fall. The shaft H is geared to the shaft *j* by gearing G G', all of which have on one or more portions of their circumference cam portions *g*, adapted during the rotation of the gearing to come into contact, as indicated in Fig. 4, and cause the shaft H to be raised. When the shaft H is raised, it also raises the die-plate I of the punching devices, since this die-plate is secured to two transverse bars H<sup>2</sup>, which are screwed to thrust-blocks H', having their under surfaces curved, as at H<sup>3</sup>, to fit to the circumference of the shaft H, as is clearly shown in Figs. 5 and 6. Secured to the top of the frame S is a transverse plate F', to which is secured on its under side a transverse punch-holding bar J'. In a recess in the bottom of bar J' is a stripper-plate I', through which the punches F extend. The stripper-plate is pushed downward by springs *j*, held in recesses J, and is prevented from falling outward by means of locking-plates J<sup>2</sup>, Fig. 6. In the position shown in Fig. 6 the action of the devices has been such as would complete the punching operation, and the further rotation of the gears G G' will permit the shaft H and the die-plate I to be lowered clear of the punches F, and permit the stripper-plate I' to clear the punches and the paper. This mechanism secures the operation of the punching-dies at predetermined times by means acting through the axis of oscillation of the frame S.

The shaft *j* is rotated by means of gearing O O', which is driven from the pinion *c* of the shaft C. The thrust-blocks H' are provided with transverse apertures *i*, having laterally-beveled faces, as shown in Figs. 5 and 6, for the purpose of permitting the escape of the small circular pieces of paper which have been punched out. In practice the punches are arranged very close together, as it is desired to almost sever the paper transversely

to its length. The paper *b* after leaving the feeding-rollers B passes under a take-up guide, thence over a guide-roller *r* and between the punch-plate I and stripper-plate I', and thence to the slitting-cutters L, and finally to the winding-spindles.

The take-up device is clearly shown in Figs. 2 and 3, and consists of a transverse pivoted bar T, journaled at the ends in extensions A' of the main frame and provided at its lower part with a curved metal plate *t*. The pivoted transverse bar T is provided with arms at its ends, which are acted upon by the tension-spring T<sup>3</sup>. The spring T<sup>3</sup> is held by the rod T<sup>2</sup>, secured to the frame A', and is adjusted by means of a thumb-nut T<sup>4</sup>. It is evident from this that the plate *t* will rise and fall to keep the paper *b* always under tension and make it travel through the machine without slack or excessive tension which might result from the irregularity of the movement of the punching devices. The paper after leaving the punching devices passes between guide-rollers K, thence between the slitting rotary cutters L, thence about the guide-rollers K', and finally to the winding-spindle M. Each strip formed by subdividing is wound upon a separate spindle, as clearly indicated by dotted lines in Fig. 1. By varying the number of cutters L and their distances apart any width of strip may be secured. The distance between rows of transverse perforations in the said sheets may be regulated by simply varying the speed of the feeding-rollers B. The cutting-knives are driven at the same speed by gearing L' and receive their motion by means of a sprocket-chain power-transmitter N, connecting one of the cutter-shafts with the rotary shaft *j*.

The winding-spindles M are loosely supported in bearings in the main frame at one end and are positively driven at the other end. At the driven end they are fitted to a socket-piece *m*, formed on the end of the shaft M', journaled in the main frame. (See Fig. 8.) Secured to the outer end of the shaft M' is a cone M<sup>4</sup>, terminating in a hub M<sup>3</sup>, which is held against longitudinal movement by ball-bearings M<sup>2</sup>. Loosely supported upon the extreme end of the shaft M' is the pulley P, having a conical friction-surface P'. Interposed between the parts P' and M<sup>4</sup> is an annular disk of leather *p*. The pulley P is driven by the band *q* from the large power-wheel R, which may be rotated at a uniform speed and preferably from a shaft of the cutters L. Where there are a number of spindles to be driven, the band *q* may pass alternately about the band-wheels P and intermediate guide-wheels *r*', which increase the frictional contact of the band upon the pulleys P. Each of the pulleys P is movable longitudinally upon the shaft M' and may be made to drive said shaft by more or less frictional contact under the adjustment of the spring P<sup>5</sup>, one end of which rests

upon a plate P<sup>2</sup>, pressing upon the outer face of the hub of the pulley P through ball-bearings *m*', and the other end of which spring rests against a plate P<sup>6</sup>, pivoted to the end of the steel center pin P<sup>7</sup>, which is carried in an adjustable stud P<sup>8</sup>. The stud P<sup>8</sup> is movable longitudinally in a guide of the main frame A and is adjusted under the action of the hand-screw P<sup>4</sup>. It will now be evident that the spindle M will be caused to rotate with constant friction between the parts P' and M<sup>4</sup> and that the extent of this friction may be increased or decreased by adjusting the spring P<sup>5</sup>. The employment of ball-bearings M<sup>2</sup> and *m*' prevents excessive friction at any part, excepting the cone, where it is desired, and also insures a uniform traction upon the paper. The normal speed of the pulley P is greater than that which is necessary to wind up the paper, as this is required to insure the spindle taking up all of the paper which is fed to it. It is also necessary to provide this compensation because as the paper winds upon the spindle each revolution thereof takes up a greater length of paper web owing to the increased diameter secured by the winding of the paper.

While I prefer the construction shown, details thereof may be modified without departing from my invention.

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

1. In a paper-perforating machine, the combination of feeding-rolls, an oscillating frame located at a distance from the feeding-rolls and provided with punching-dies, means to operate the punching-dies at predetermined times operating through the axis of oscillation of the oscillating frame, slitting-cutters for subdividing the web longitudinally after it has been punched, means to oscillate the frame intermediate of the feeding-rolls and slitting-cutters, and a series of separate winding devices for respectively receiving the several strips of the perforated web of paper.

2. In a paper-perforating machine, the combination of feeding-rolls, an oscillating frame provided with punching-dies movable about the axis of said frame, means to operate the punching-dies at predetermined times, a take-up device between the feeding-rolls and the punching devices, means to oscillate the frame, connecting devices between the means to operate the punching-dies and means for oscillating the frame so as to time their movements, and winding devices for receiving the perforated web of paper.

3. In a paper-perforating machine, the combination of feeding-rolls, an oscillating frame provided with punching-dies, means to operate the punching-dies at predetermined times and while the frame is moving away from the feeding-rolls, means for returning the oscillating frame to a normal intermediate position, independent means to oscillate the frame, and winding devices for receiving the perforated web of paper.

4. In a paper-perforating machine, the combination of feeding-rolls, an oscillating frame provided with punching-dies, means to operate the punching-dies at predetermined times, 5 a take-up device between the feeding-rolls and the punching devices consisting of a pivoted plate against which the paper is drawn, a spring to move the plate against the action of the paper and a transverse guide adjacent 10 to the plate over which the paper is guided to the perforating devices.

5. In a paper-perforating machine, the combination of feeding-rolls, an oscillating frame located at a distance from the feeding-rolls and provided with punching-dies, means to oscillate the frame, connecting power devices 15 between the means for oscillating the frame and means for operating the punching-dies, and winding devices for receiving the perforated web of paper.

6. In a paper-perforating machine, the combination of feeding-rollers, reciprocating punching devices for punching the paper at intervals, a take-up or tension device acting 25 upon the paper and located between the feeding-rolls and punching devices, means to reciprocate the punching devices to or from the take-up or tension device, winding devices for receiving the perforated paper as a perforated web, and devices for operating the winding devices under uniform tension so as not 30 to break the web into sheets.

7. In a paper-perforating machine, the combination of feeding-rolls, punching devices 35 for punching the paper at intervals, a take-up or tension device acting upon the paper and located between the feeding-rolls and punching devices consisting of a pivoted plate against which the paper is drawn, a stationary guide over which the paper is moved and 40 an adjustable spring acting upon the plate to press it against the paper web with an elastic pressure, and winding devices for receiving the perforated paper.

8. The combination of feeding devices, a pivoted oscillating frame, punching devices consisting of a stationary part and a movable part carried by the oscillating frame, cams 45 carried on the oscillating frame for operating the movable part of the punching devices at intervals, power devices for simultaneously operating the feeding devices the oscillating frame and cam devices, and means to wind 50 the perforated web of paper after leaving the punching devices.

9. The combination of feeding devices, a pivoted oscillating frame, punching devices consisting of a stationary part and a movable part carried by the oscillating frame, cams 55 carried on the oscillating frame for operating

the movable part of the punching devices at intervals, power devices for simultaneously operating the feeding devices the oscillating frame and cam devices, and tension or take-up devices for the web of paper intermediate 65 of the feeding and punching devices.

10. The combination of punching-dies consisting of a stationary part and a movable part, a rotary shaft acting upon the movable part of the punching devices, a power-shaft, 70 gearing between the power-shaft and rotary shaft provided with cam portions for moving the rotary shaft away from the power-shaft at intervals for the purpose of operating the movable part of the punching devices, and 75 means to feed the web of paper between the punching devices.

11. In machines for punching paper, the combination of stationary punches, a punch-plate I movable to and from the punches, a 80 stripper-plate I' moving over the punches, a shaft H parallel to the punch-plate and intermediate blocks H' resting upon the shaft at H<sup>3</sup> and supporting the punch-plate at intervals, and cam devices for moving the shaft 85 together with the punch-plate to and from the punches.

12. In a paper-punching machine, the combination of devices for feeding and punching the web of paper, a winding spindle or shaft, 90 a shaft for operating the winding-spindle, a rotating wheel for driving the shaft, a friction device between the driving-wheel and shaft, antifriction-bearings for holding the shaft against longitudinal movement under 95 the action of the friction devices, a spring acting upon the wheel to produce friction, means to adjust the tension of the spring, and antifriction-bearings between the spring and the wheel. 100

13. In a paper-punching machine, the combination of devices for feeding and punching the web of paper, a winding spindle or shaft, a shaft for operating the winding-spindle, a 105 rotating wheel for driving the shaft, a friction device between the driving-wheel and shaft, antifriction devices for holding the shaft against longitudinal movement under the action of the friction devices, a spring acting upon the wheel to produce friction, 110 means to adjust the spring consisting of a plate P<sup>6</sup> and an adjustable block having a center P<sup>7</sup>, and antifriction-bearings between the spring and the wheel.

In testimony of which invention I hereunto 115 set my hand.

HENRY P. FEISTER.

Witnesses:

FRANCIS S. LAWS,  
SAMUEL BROWN.