

(No Model.)

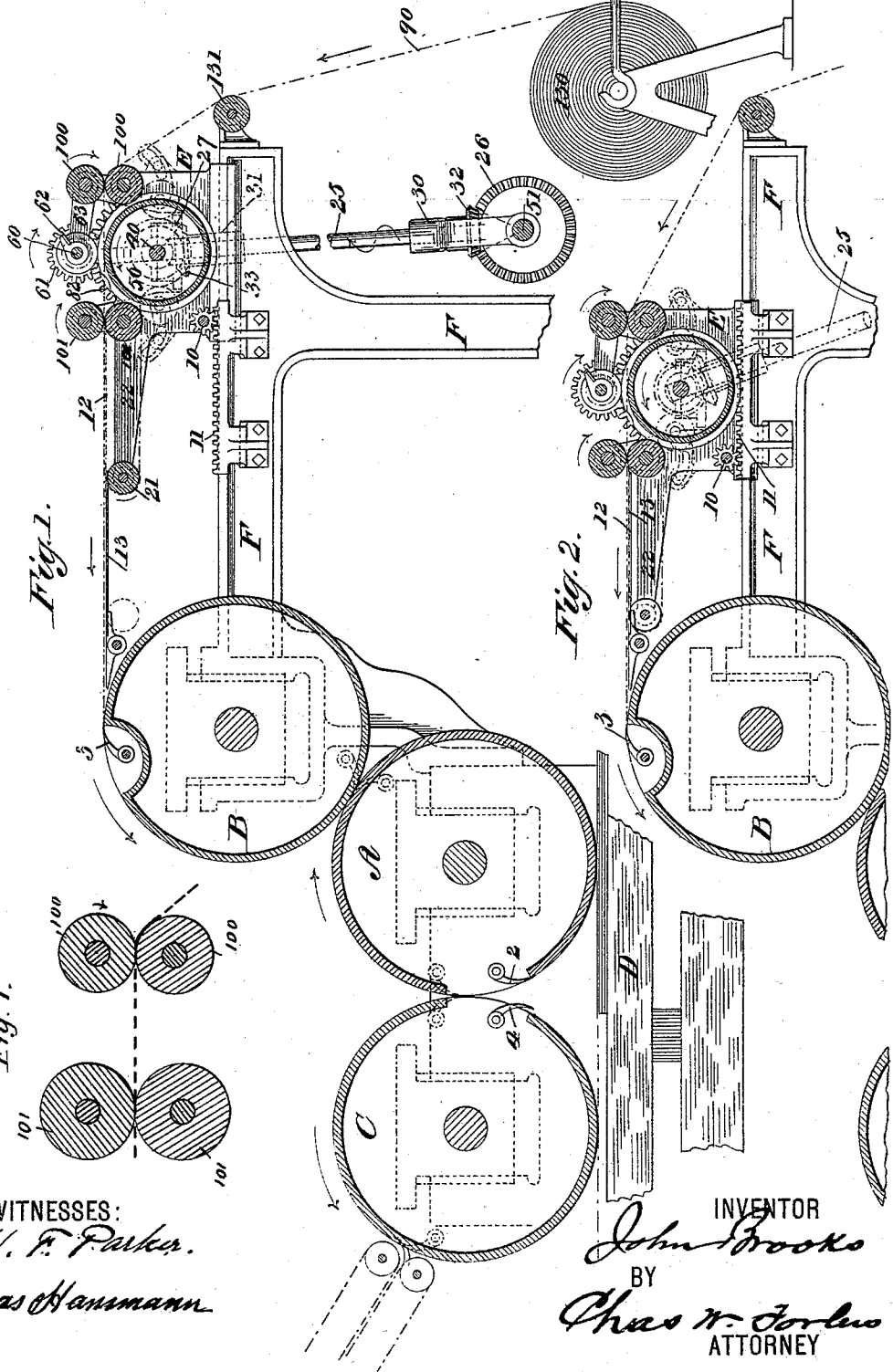
2 Sheets—Sheet 1.

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MECHANISM FOR CUTTING VARIABLE LENGTHS OF SHEETS FROM PAPER WEB.

No. 439,862.

Patented Nov. 4, 1890.



WITNESSES:  
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# UNITED STATES PATENT OFFICE.

JOHN BROOKS, OF PLAINFIELD, NEW JERSEY.

MECHANISM FOR CUTTING VARIABLE LENGTHS OF SHEETS FROM PAPER WEB.

SPECIFICATION forming part of Letters Patent No. 439,862, dated November 4, 1890.

Application filed November 22, 1889. Serial No. 331,184. (No model.)

*To all whom it may concern:*

Be it known that I, JOHN BROOKS, a citizen of the United States, residing at Plainfield, in the county of Union and State of New Jersey, have invented certain new and useful Improvements in Mechanism for Cutting Variable Lengths of Sheets from Paper Web, of which the following is a specification, reference being had to the accompanying drawings, in which—

Figure 1 is a vertical longitudinal section of a part of a cylinder printing-machine embodying my invention, the cutting mechanism being adjusted for cutting long sheets; Fig. 2, a similar view showing the cutting mechanism adjusted for cutting short sheets; Fig. 3, an enlarged side elevation of the cutting mechanism; Fig. 4, an enlarged vertical section on the line *x x*, Fig. 5, showing the cutter, the cutting-cylinder, and the feed-rolls; Fig. 5, an enlarged end elevation of the cutting mechanism, and Fig. 6 a plan view thereof on a similar scale. Fig. 7 is an enlarged diagrammatic view of the two pairs of feed-rolls, the difference in diameter being much exaggerated.

My invention is especially adapted to cylinder printing-presses with a web-supply, and it consists of a rotary cutter and operating mechanism therefor whereby the cutter has continuous rotation but intermittent action. By this means the sweep of the cutter is materially reduced for given intervals of cutting and the mechanism reduced into compact form. The surface speed of the cutter is invariably the same, and always in excess of the speed of the paper. The variability in the length of sheets is obtained by varying the length of web fed to the cutter in a given interval by regulating the speed of the feed-rolls.

I have illustrated my invention in connection with a printing-machine in which the impression-cylinder A has continuous rotation, the gripper mechanism thereof receiving the head of the sheet at each second revolution of the cylinder, the cutting mechanism herein being adjustable at variable distances from the seizing-point of the grippers to compensate for the different rates of feed given to the web, and mechanism for imparting to the cutter a single action at each two revolu-

tions of the impression-cylinder, as more fully illustrated and described in Letters Patent No. 413,491, issued to me October 22, 1889. I have also herein shown, in connection with my invention, an auxiliary feed-cylinder B, carrying the grippers 3, which first seize the head of the sheet and transfer the same to the first impression-cylinder A, further details being shown in my patent application, Serial No. 325,895, filed October 3, 1889.

C is the second impression-cylinder, bearing grippers 4; D, the type-bed, and 51 a shaft driven by the printing mechanism at the rate of one revolution for every two revolutions of the impression-cylinder, similar to the shaft similarly designated in said patent.

The carriage E, bearing the cutting mechanism, is movable on the side frames F of the printing mechanism, being operated by means of pinions 10 on the carriage, which engage with stationary racks 11 on the frame F.

12 are conveying-belts, and 13 a bridge composed of parallel bars, whereby the sheets are conveyed from the feed-rolls of the cutter to the grippers 3 of the auxiliary cylinder B. The conveying-belts are driven by the lower feed-roll 101, and are distended over loose pulleys 21 on the stationary arms 22 at a fixed distance from the carriage E, the said belt-pulleys and belts intervening the bridge-bars.

25 is a bevel-gear counter-shaft in swiveled bearings 30 31 for transmitting motion from the beveled gear 26 on the shaft 51 to the beveled gear 27 on the shaft 40 of the cutting mechanism, irrespective of the position of the carriage E.

The shaft 40 is the main or driving shaft of the cutting mechanism, and carries the female cutting-cylinder 50. The diameters of the bevel-gears 26 32 are as two to one, respectively, the diameters of the bevel-gears 33 27 being equal, whereby the shaft 40 and cylinder 50 thereon make two revolutions to every one of the shafts 51, or equal revolutions with the impression-cylinder.

The cutter-shaft 60 is driven two revolutions to every one of the shaft 40 by the spur-gear and pinion 41 61, the radius of the knife 62, which is fixed, being one-half of the cutting-cylinder. It being desired to cut one

sheet for every two revolutions of the impression-cylinder, it becomes necessary that the cutter shall act at every second revolution of the female cutting-cylinder 50 or every fourth revolution of the cutter itself. In order to accomplish this, the cutter-shaft 60 is journaled in the free ends of the arms 63, fulcrumed on the shaft 70, and a slight vertical motion is imparted to the shaft 60 sufficient to render the cutter active or inactive at desired intervals when it passes the paper.

The vertical motion of the shaft 60 is imparted by the cam 80, having a circular periphery, which normally elevates the knife out of action, and a single depression 81, which permits the knife to drop into an active position. The periphery of the cam 80 bears on the periphery of the disk 64, loose upon the shaft 60, therefore acting as an anti-friction roller. The cam 80 is loose upon the shaft 40, being driven without reference to it, and to the side of the cam-disk 80 is fastened a spur-gear 82, also loose upon the shaft 40, and which is driven by a pinion 65, fast to the shaft 60. The pinion 65 and spur-gear 82 are proportioned one to four, whereby the depression 81 of the cam 80 passes the roller 64 and allows the knife to enter the groove 52 of the cylinder 50 once at every four revolutions of the cutter.

It is to be noted that the cylinder 50 may be provided with any number of grooves 52 at intervals divisible by the circumference of the path of the cutting-knife, and that the cam 80 may bear a plurality of depressions 81 or be driven by differently-proportioned gears 65 82 than those shown, should it be desired to cut shorter sheets than those within the limits herein intended.

The surface-speed of the cutter and the periods of cutting being at fixed intervals, the variation in the length of sheet is governed by the speed at which the web is fed by the feed-rollers 100 101. I find in practice that the act of cutting may be performed more advantageously when the rotary cutter is driven at a surface speed considerably in excess of the speed of the paper than when driven at an equal or nearly equal speed therewith. The surface speed of the cutter herein given is sufficient, whereby the necessary variation in the speed of the paper to cut different lengths of sheets may be made within a range below the speed of the cutter.

The feed-rolls 100 101 are driven through transmitting-gears 102, 102, from the interchangeable-gear 103 on the shaft 40, which gear 103 may be substituted by different sizes to vary the speed of the feed-rolls, the transmitting-gears 102 being carried on gudgeons 104 on slotted sectors 105, concentric with the gears on the shafts 110, 111, whereby said gears 102 are suitably adjusted and secured by clamping-screws 106. Motion is thereby transmitted to the several feed-rolls through the respective trains of gears illustrated in Fig. 3, namely, gears 120 121 122 123. These

gears are of substantially equal diameters; but the circumferences of the second pair of feed-rolls 101 are a little greater than the circumferences of the first pair 100, as shown in Fig. 7 much exaggerated, whereby a tension of the paper is maintained under the cutter, and in this respect the said feed-rolls act as tension feed-rolls.

90 represents the web, and 130 the roll from which it is drawn by the first pair of feed-rolls 100, being carried over the idle-roller 131 and directed to said feed-rolls in the various positions of adjustment of the carriage E.

In the operation of the machine there are but two adjustments necessary—that of the change-gear 103 and that of the movable carriage E—in order to determine the length of sheet to be cut. For convenience a suitable indicating-scale may be placed upon the frame F to denote the length of sheet in inches corresponding to any given position of the carriage, and the change-gears be suitably numbered correspondingly thereto.

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

1. In mechanism for cutting variable lengths of sheets, the combination of tension feed-rolls having variable adjustment of speed, and a rotary cutter having a given speed and an orbit of variable center, so as to rotate in or out of cutting contact with the paper.

2. In mechanism for cutting variable lengths of sheets, the combination of tension feed-rolls having variable adjustment of surface speed, and a rotary cutter having a given surface speed in excess of the range of variability in the surface speed of the tension feed-rolls, said feed-rolls being mounted upon opposite sides of the cutter, whereby the paper is maintained under tension in passing the cutter, substantially as described.

3. In mechanism for cutting variable lengths of sheets, the combination of feed-rolls having variable adjustment of speed, a rotary cutter, and a female cutting-cylinder having given speed, said cutter having its axis of rotation movable toward or from said cylinder.

4. In a paper-cutting mechanism for severing the web transversely, the combination of tension feed-rolls, a rotary transverse cutter having the shaft about which it rotates movable toward or from the paper, and a cam controlling the movement of said shaft automatically at given periods of rotation thereof.

5. In paper-cutting mechanism for severing the web transversely, the combination of tension feed-rolls, a rotary transverse cutter having its shaft movable toward or from the paper, a cam controlling the movement of said shaft, and a spur-wheel on the cam driven by a pinion on said shaft, whereby the cutter is advanced or retracted automatically, in the manner described.

6. In paper-cutting mechanism for sever-

ing the web transversely, the combination of feed-rolls, a rotary transverse cutter, a female cutting-cylinder, the shaft about which said cutter rotates being movable toward or from  
5 said cylinder.

7. In paper-cutting mechanism for severing the web transversely, the combination of feed-rolls, a rotary transverse cutter, a female cutting-cylinder, the shaft of the cutter being  
10 movable toward or from said cylinder, a circular cam having a depression acting on the shaft of the cutter, and gearing whereby the cam is rotated in given relation to the rotation of the cutter.

15 8. In a mechanism for cutting variable lengths of sheets, the combination of a rotary cutter, a driving-shaft, as 40, for said cutter, having a given speed, a change-gear on the driving-shaft, and two sets of feed-rolls, one  
20 at either side of the cutter, one set having a greater circumference than that of the other, gearing on said feed-rolls driven by said change-gear, and a variable adjustment of speed lower than the given speed of the cutter,  
25 substantially as described.

9. In mechanism for cutting variable lengths of sheets, the combination of a rotary cutter, a female cutting-cylinder, movable journals bearing the cutter at variable distances from

said cylinder, a circular cam loose on the cylinder-shaft having a depression, a roller on  
30 the cutter-shaft engaging with the periphery of the cam, a spur-wheel on the cam, and a pinion on the cutter-shaft giving the cam a single revolution for a plurality of revolutions  
35 of the cutter, feed-rolls for the paper, gears thereon, and a change-gear on the shaft of said cylinder, imparting motion to the feed-roll gears through adjustable transmitting-gears, whereby the paper is fed at a variable  
40 adjustment of speed lower than the given speed of the cutter.

10. In a paper-cutting mechanism, the combination of a rotary cutter, a female cutting-cylinder, said rotary cutter making a plurality  
45 of revolutions for each revolution of the said cylinder, mechanism, substantially as described, for feeding a determinable amount of paper at the intervals of cutting, and mechanism, substantially as described, for advancing  
50 and retracting the orbit of the cutter toward or from the said cylinder at intermittent periods in the rotation of said cutter.

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