(No Model.) 3 Sheets—Sheet 1.

J. BROOKS.

SHEET SUPPLYING MECHANISM FOR PRINTING PRESSES.

No. 439,861. Patented Nov. 4, 1890.

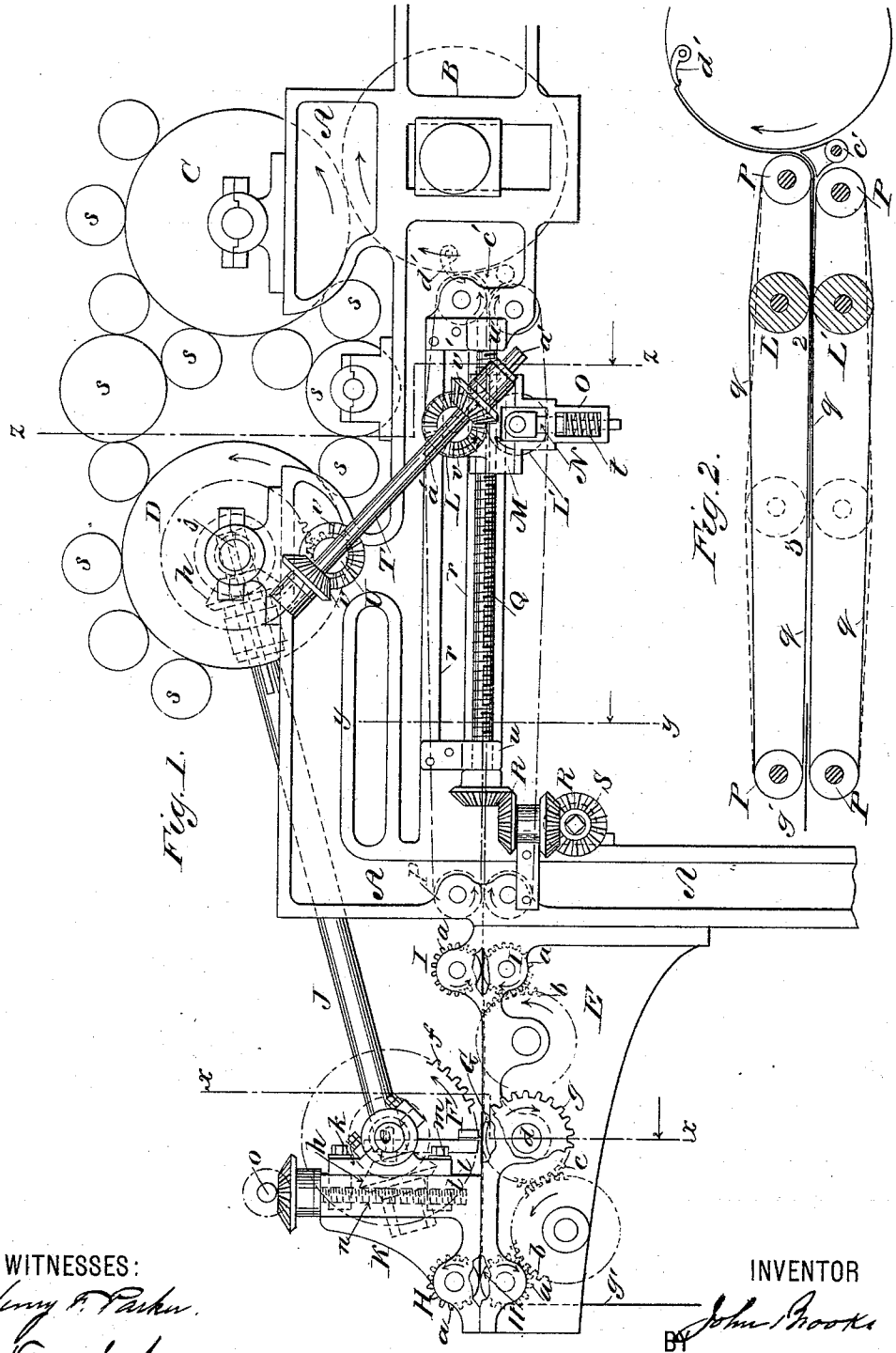


Fig. 1.

Fig. 2.

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(No Model.) 3 Sheets—Sheet 2.

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SHEET SUPPLYING MECHANISM FOR PRINTING PRESSES.

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Fig. 3.

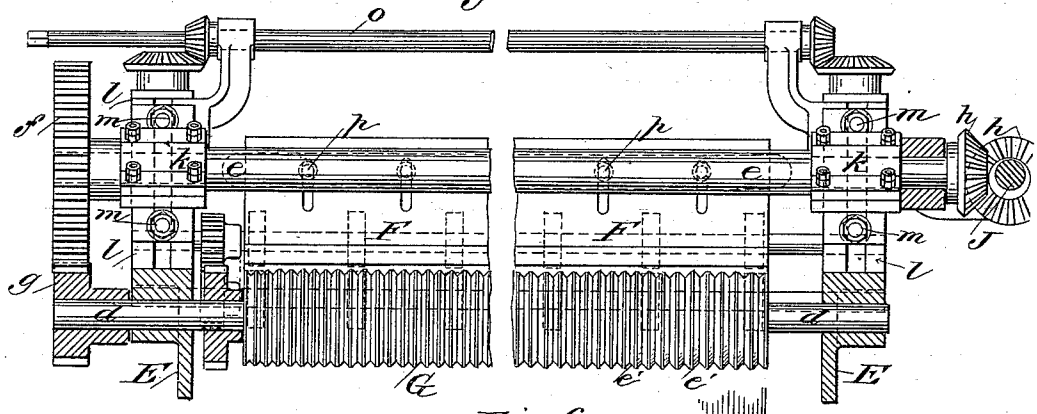


Fig 6.



Fig. 4.

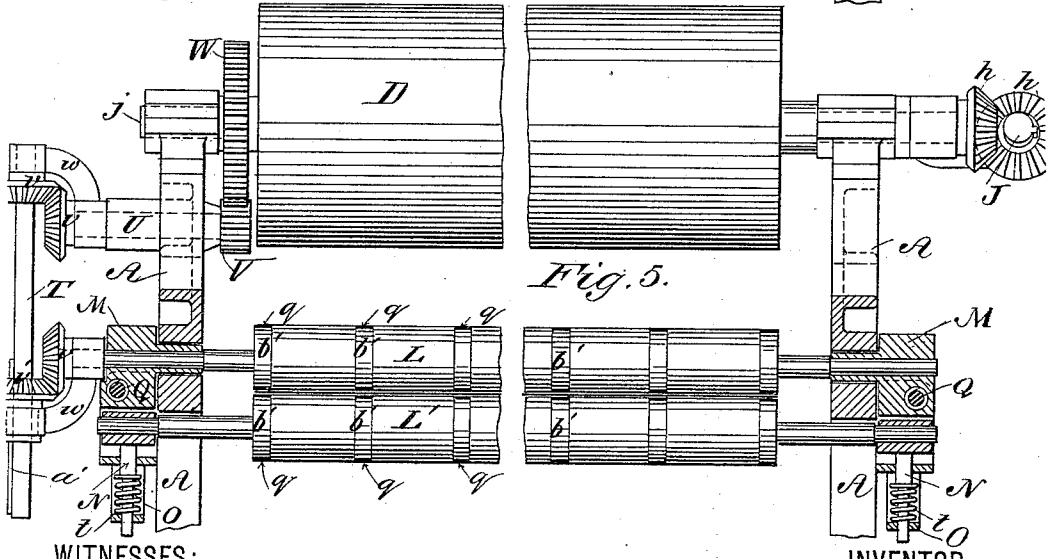


Fig. 5.

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Fig. 7.

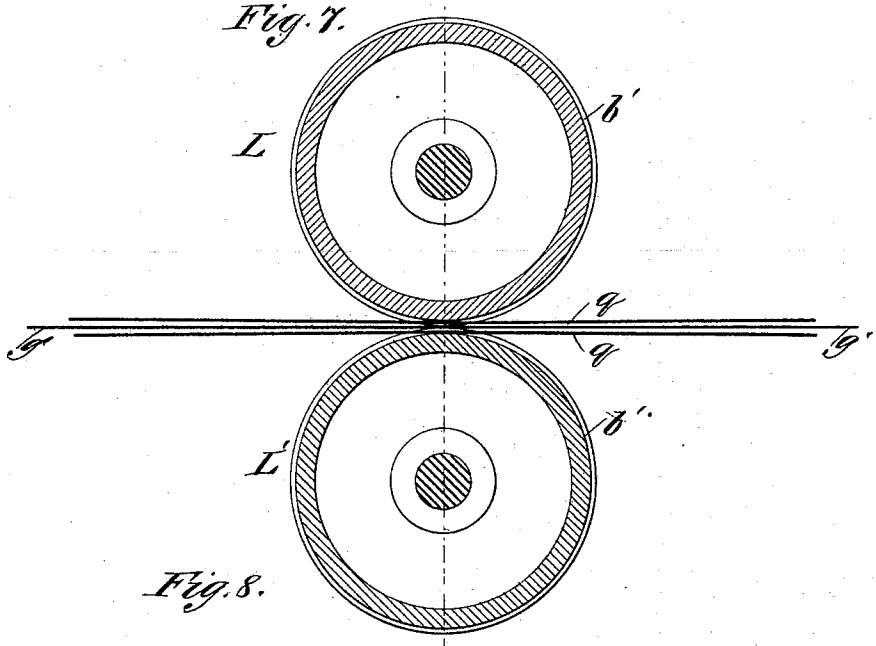
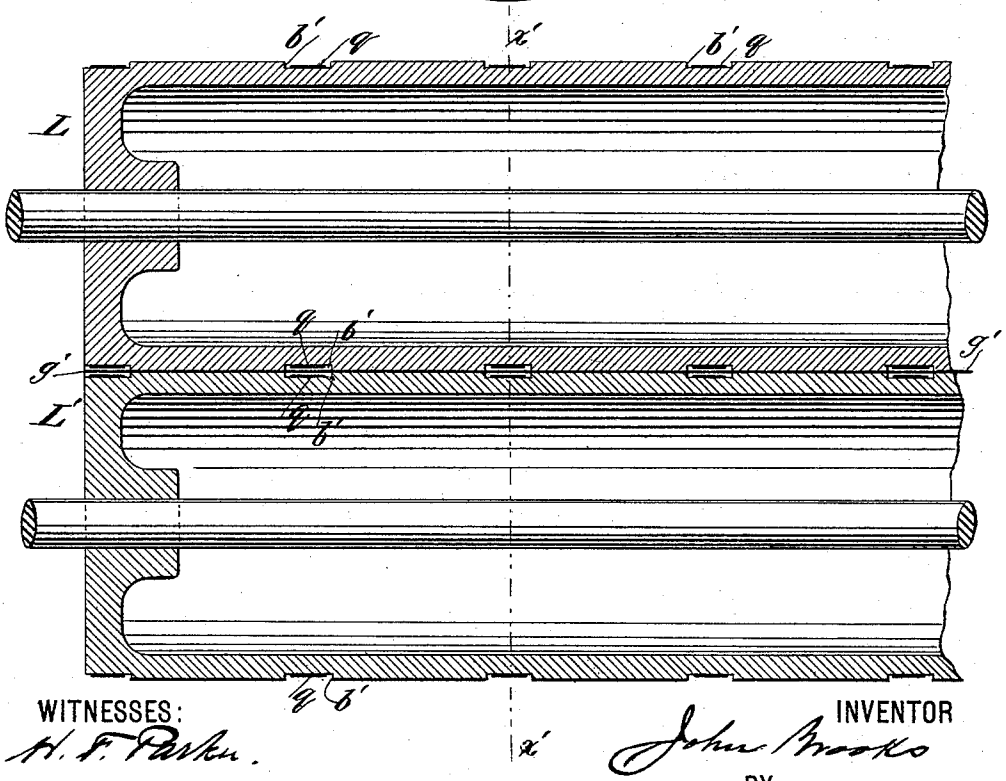


Fig. 8.



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UNITED STATES PATENT OFFICE.

JOHN BROOKS, OF PLAINFIELD, NEW JERSEY.

SHEET-SUPPLYING MECHANISM FOR PRINTING-PRESSES.

SPECIFICATION forming part of Letters Patent No. 439,861, dated November 4, 1890.

Application filed March 22, 1888. Serial No. 268,079. (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, State of New Jersey, have invented certain new and useful Improvements in Sheet-Supplying Mechanism for Printing-Presses, of which the following is a specification.

My invention relates to rotary presses, in the operation of which the sheets to be printed are partly severed from a continuous web of paper by perforation and subsequently parted and fed to the impression-cylinder by means of feed-rolls adjustable in the line of feed, driven at a higher surface speed than the rolls of the perforating mechanism, and which thereby separate the sheets at the points of perforation during their transit from the perforating mechanism to the impression-cylinder at variable periods. The perforating-knife employed herein, which partly severs the sheets from the web, is altered to cut different lengths of sheets by a radial adjustment upon its shaft, to which a fixed rate of revolution is imparted. The surface speed of the paper through the perforating mechanism is therefore variable, according to the circular path described by the knife, the lesser length of sheets requiring a greater time to be cut having a lower surface speed.

The object of the invention is to part and deliver the partly-severed sheets in whatever length they may be perforated, so as to register correctly at the impression-cylinder, irrespective of the variable surface speed of the cutting.

My invention consists in a novel construction and arrangement of the adjustable feed-rolls which part the sheets, whereby their function is performed at a positive period when the leading end of the perforated web arrives at the exact point of the "bite" or line of direct contact which is maintained in the rolls. Such rolls are herein termed the "breaking-rolls."

Heretofore rolls have been employed that are adjustable in the line of paper-feed for a similar purpose, but have been located in a relative position to each other, whereby their surfaces are out of actual contact, the conveying-belts between them being distended and brought together by tension due to the oblique position of the rolls, the said belts being therefore depended on to seize the sheet and cause its separation from the web at the point of perforation, such construction rendering the period of breakage less positive than by the construction herein described.

My invention also consists in improved mechanism for adjusting and driving the breaking-rolls at the different points of adjustment in the line of paper-feed, the distance of location of said rolls from the impression-cylinder and from the perforating mechanism being adapted to compensate for the difference of speed at which the various lengths of sheets are perforated, and whereby the leading end of the sheet shall in the case of each adjustment in the cutting be brought into position for seizure by the grippers of the impression-cylinder.

This application also contains a novel construction of the rotating cylinder upon which the perforating-knife acts, whereby said cylinder is adapted to present a coinciding surface at any part of its circumference to the toothed edge of the knife, according as the latter may act at different parts of its cylinder-surface; but this subject-matter will be presented in a separate application, and is not claimed herein.

Referring to the accompanying drawings, forming a part of this specification, and in which like letters and figures of reference indicate corresponding parts through the several views, Figure 1 is a side elevation of a part of a rotary press, a perforating mechanism, and the adjustable feed or breaking rolls and their operating mechanism connected thereto; Fig. 2, a detail view, being a longitudinal section of the adjustable feed-roll mechanism; Fig. 3, a transverse section on the line $x\,x$, Fig. 1; Fig. 4, a transverse section on the line $y\,y$, Fig. 1; Fig. 5, a transverse section on the line $z\,z$, Fig. 1; Fig. 6, a detail view relating to the cutting-cylinder; Fig. 7, an enlarged cross-section of the breaking-rolls, being taken on the line $x'\,x'$, Fig. 8; and Fig. 8, a longitudinal section of Fig. 7.

A A are the side frames of the machine, suitably connected together by transverse frames and extending throughout the length of the press, bearing the first impression-cylinder B, the type-cylinder C, and inking-cyl-

inder D, with its distributing-rolls S, and usually a second series of said cylinders, together with such other appliances as may be employed for the perfecting or printing of both sides of the sheets, and which are omitted, showing only such parts as are essential to illustrate the character of the invention.

E E are extensions of the side frames A A, which bear the perforating mechanism consisting of the perforating-knife F, the cutting-cylinder G, two pairs of feed-rolls H H I I, made up of series of pulleys, as indicated in Fig. 3, or of uniform cylinders in the instance of I I, and geared together by gears *a a*, driven by the intermediate gears *b b* from the gear *c* on the cutting-cylinder shaft *d*. The cutting-cylinder is driven from the knife-shaft *e* by gears *f g*, and the knife-shaft in turn driven by a counter-shaft J, by which rotation is imparted to the entire perforating mechanism through the miter-gears *h* from any suitable shaft in the machine, as the shaft *j* of the inking-cylinder D.

The construction of the perforating mechanism and its driving counter-shaft J corresponds in principal features to that which I have described in an application for a patent, filed June 23, 1887, Serial No. 242,219, and will not therefore require specific description here. The frame K, however, (shown and described in said application as a movable carriage,) is in the present instance stationary, and the adjustment acquired by the said movable carriage to accomplish the registering of different lengths of paper is dispensed with, this function being performed by the adjustment given to the breaking-rolls, as aforesaid and as hereinafter fully described in detail.

The spur-gear *f* of the vertically-adjustable knife-shaft *e* is interchangeable with other spur-gears of different sizes, according to the position of said shaft.

k k are the adjustable bearings moved on the guides *l* of the frame *k* when the screws *n* are turned by the shaft *o* and its miter-gears. The bolts *m* and *p* secure the bearings and the knife, respectively, when adjusted.

L L′, Figs. 1, 2, and 5, are the breaking-rolls, which are made adjustable to and fro by movement of their bearing-blocks in the guides *r* in the sides of the frames A A. The upper or driving roll L has positive bearings in the bearing-blocks M, as seen in Fig. 5, while the lower roll L′, which is propelled by frictional contact with the upper roll or through the intervening paper, or by being geared to the upper roll, has yielding bearings on the independent spring-supported studs N, hung in the depending frame O of the bearing-blocks M. The springs *t* exert a uniform pressure of the roll L′ against the roll L at all times during the passages of each successive sheet of paper or at the intervals between their passage, or under varying thicknesses of paper.

The bearing-blocks M are moved simultaneously for adjustment in the guides *r* by means of the screws Q, the screw-shafts rotating upon bearings *u*, and the system of miter-gears R at each side of the machine, and the transverse connecting-shaft S imparting motion by application of a crank at its squared ends, as will be understood from the drawings, Fig. 4.

The upper or driving roll L is rotated at the surface speed of the press and receives its motion, irrespective of its different positions, by means of a counter-shaft T and system of miter-gears *v*, working in swiveled brackets *w*, Fig. 5, the miter-gear *v′* being longitudinally movable on the shaft T, but rotatively connected therewith, as by means of a feather *a′*, whereby any position the shaft T may assume about the axis of the shaft U will operate the roll L. The shaft U carries one of the miter-gears, as shown, and also carries a pinion V, which meshes with the spur W on the inking-roll shaft *j*, obtaining the increase of rotating speed necessary to give the equal surface speed to the roll L as that of the impression and other cylinders B C D.

P are the conveying-belt pulleys (see Fig. 4) which carry the conveying-belts *q* to convey the paper to the rolls L L′ and thence to the first-impression cylinder B, but which do not bind upon the paper sufficiently to part it from the web before the arrival of its leading end between said rolls L L′, exerting only a frictional pressure sufficient to carry the sheet along. The conveying-belts are driven by suitable gearing between the impression-cylinder B and the rolls P adjacent thereto, such gears being well understood in practice and omitted in the drawings. The rolls L L′ are provided with circumferential depressed surfaces or grooves *b′*, (clearly shown in Figs. 7 and 8,) corresponding in width and position with the pulleys P and conveying-belts *q*, whereby the latter are passed between said rolls without acting upon the paper with any degree of pressure.

c′ is a guide or a series of guides extending throughout the width of the sheet to convey its leading edge upward into position to be seized by the grippers *d′*, which latter are also ranged in series and operated as usual in practice on the impression-cylinder.

The cutting-cylinder shown herein has circumferential **V**-shaped grooves *e′* made in series throughout the lengths of the cylinder, and which exactly fit the toothed edge of the perforating-knife, so as to coincide with the same at any circumferential point alike, according as the knife may variously engage at its different radial adjustments. The knife-edge may or may not be permitted to close entirely on the grooves, as the case may be, according as it is desired to completely sever or to merely perforate the web. The action of perforation is indicated on an enlarged scale by Fig. 6, the grooves being sufficiently fine in practice to avoid buckling or gathering of the sheets at the point of perforation. The ridges between the grooves *e′* are slightly flattened, in order to present a smooth sur-

face and avoid creasing the paper as it is drawn taut over the surface of the cutting-cylinder.

The perforating-knife and the rolls L L′ are shown in the drawings at their position for cutting and feeding a length of sheet approaching the maximum limit, and in operation the web G′ is drawn from the spool between the feed-rolls or pulleys H H and to the feed-rolls I I and held taut between the two pairs of feed-rolls during the perforating operation and at all times during its passage, thereby assisting the action of the knife and preventing buckling of the paper.

The knife-shaft *e* and its interchangeable spur-gear G are rotated at a given rate of revolution by the shaft J, and impart, therefore, an alterable rate of surface speed to the pinion *g* and cutting-cylinder, according to the size of spur-gear employed for the different knife adjustments. The web next passes between the first belt-pulleys P and the conveying-belts *q*, which travel at a speed in excess of the rolls I, conveying the paper, but not severing it. The severing or parting of the sheets is performed upon arrival of the leading end of the web between the breaking-rolls L L′, when it is seized in the bite of the rolls, and, receiving the increased surface speed, is at the instant of arrival in the line of contact of said rolls at once parted at the line of perforation, leaving the end of the web to follow between the conveying-belts, as indicated in Fig. 2, and introducing the leading end of the severed sheet so as to project above the guides *c′* at the moment of passage of the grippers *d′*. It is obvious that this moment of arrival of the sheet at the grippers will be determined by the period of its acceleration during transit, which changes it from a variable lower surface speed to a given higher surface speed as it approaches the impression-cylinder.

In the adjustment shown by the drawings for cutting long sheets—say thirty-eight inches—the surface speed of the knife, the cutting-cylinder, and the rolls I I is of a rate which will forward the leading end of the web to the position 2 of the rolls L L′ before its required acceleration to subsequently tally with the grippers *d′*, whereas the cutting-speed of a shorter sheet of, say, thirty-two inches will forward the leading end of the web to an intermediate point, as 3, at which it is required to be accelerated, the breaking-rolls L L′ being brought to that position, accordingly, by movement of the screws Q.

The slides *r* may be provided with a suitable scale graduated to correspond with the required positions of the breaking-rolls for given lengths to be cut, and to correspond, also, with a scale usually employed on the slides for the knife-shaft bearings, the adjustment being thereby made readily determinable.

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

1. The combination of a web-severing device adapted to cut or perforate variable lengths, feed-rolls in advance of the severing device, accelerated parting-belts, and breaking-rolls adjustable within the extent of the parting-belts and adapted to positively impinge upon the paper between the parting-belts, and having circumferential grooves for the free passage of said belts without nipping the latter, substantially as described.

2. The combination of a web-severing device adapted to cut or perforate variable lengths, feed-rolls in advance of the severing device, accelerated parting-belts mounted independent of the feed-rolls, and breaking-rolls adjustable within the extent of the parting-belts, substantially as described.

3. The combination of a web-severing device adapted to cut or perforate variable lengths, two pairs of feed-rolls, one pair on each side of the severing device, accelerated parting-belts mounted independent of the feed-rolls, and breaking-rolls within the extent of the parting-belts, substantially as described.

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