(No Model.) 4 Sheets—Sheet 1.

J. BROOKS.

MECHANISM FOR CUTTING OR PERFORATING VARIABLE LENGTHS OF PAPER WEB FOR PRINTING PRESSES.

No. 456,190. Patented July 21, 1891.

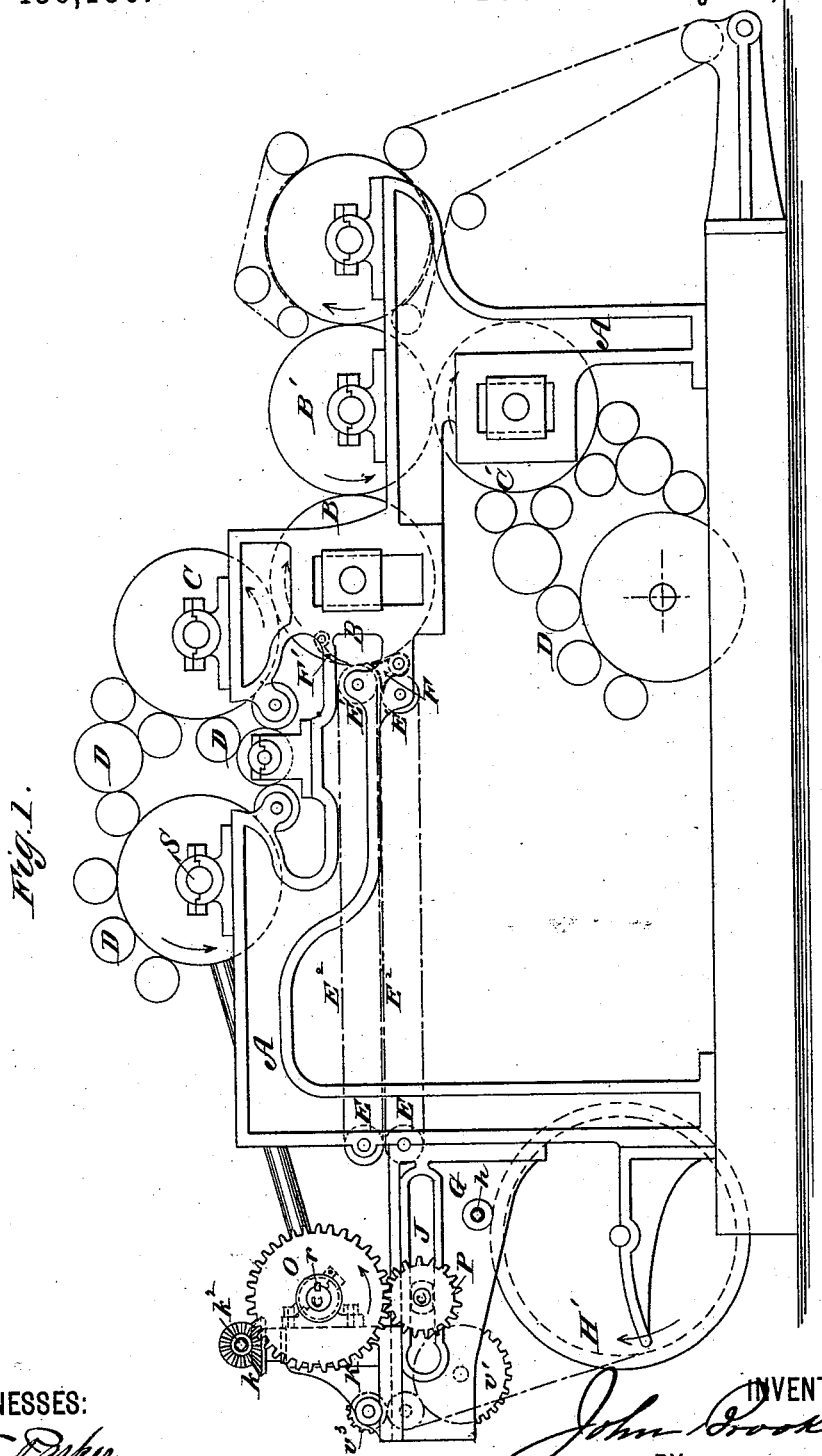

Fig. 1.

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(No Model.) 4 Sheets—Sheet 2.

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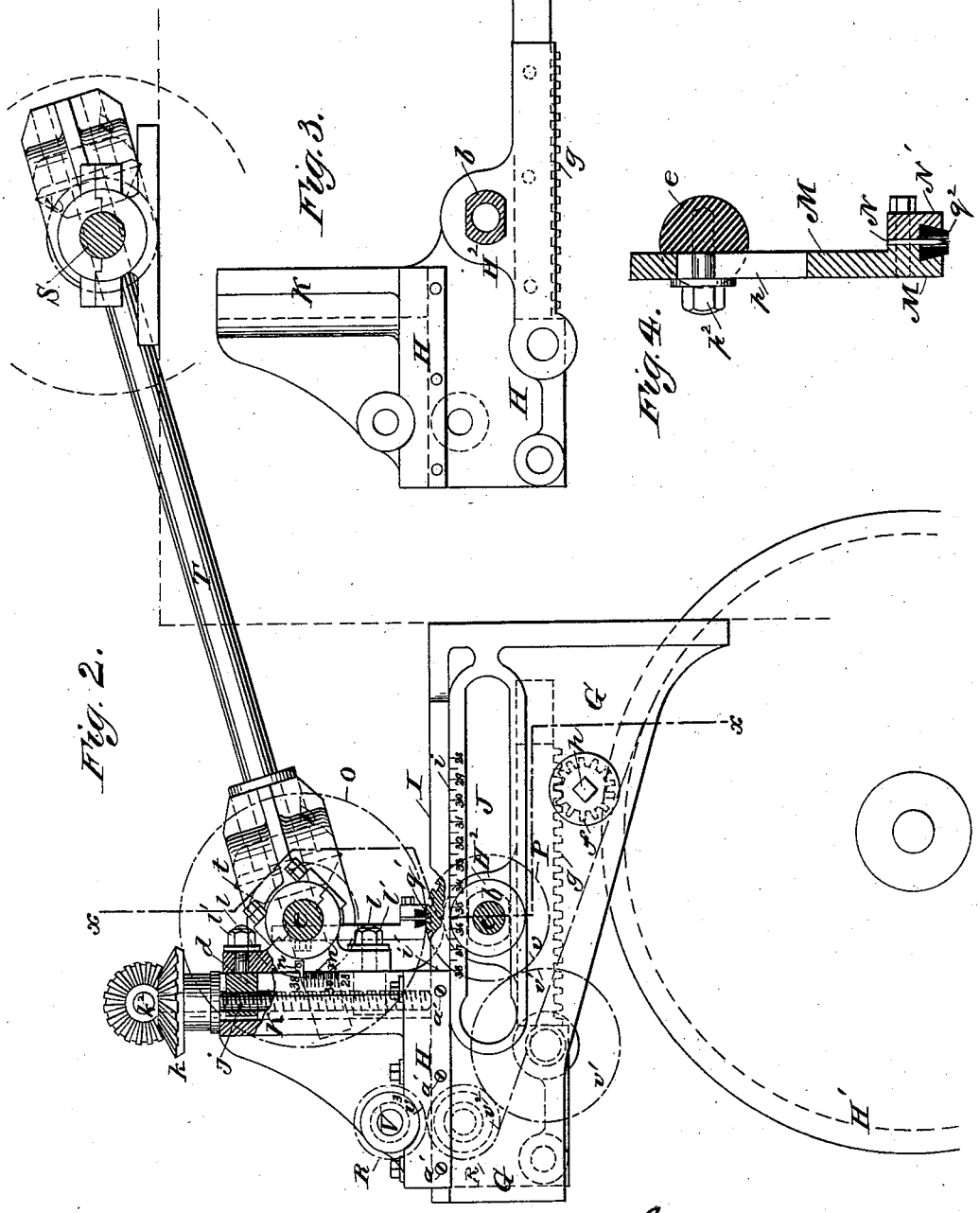
Fig. 3.

Fig. 4.

Fig. 2.



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(No Model.) 4 Sheets—Sheet 3.

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MECHANISM FOR CUTTING OR PERFORATING VARIABLE LENGTHS OF PAPER WEB FOR PRINTING PRESSES.

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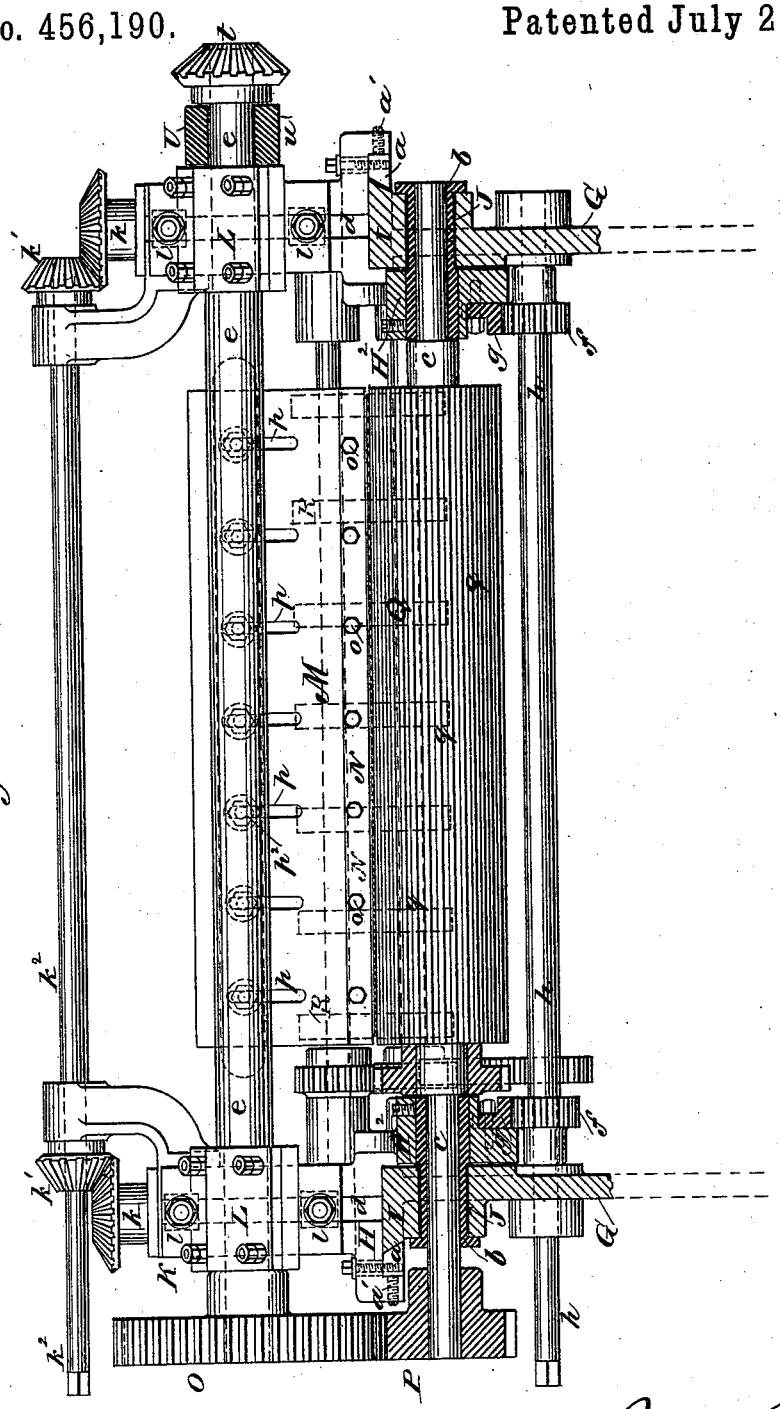

Fig. 5.

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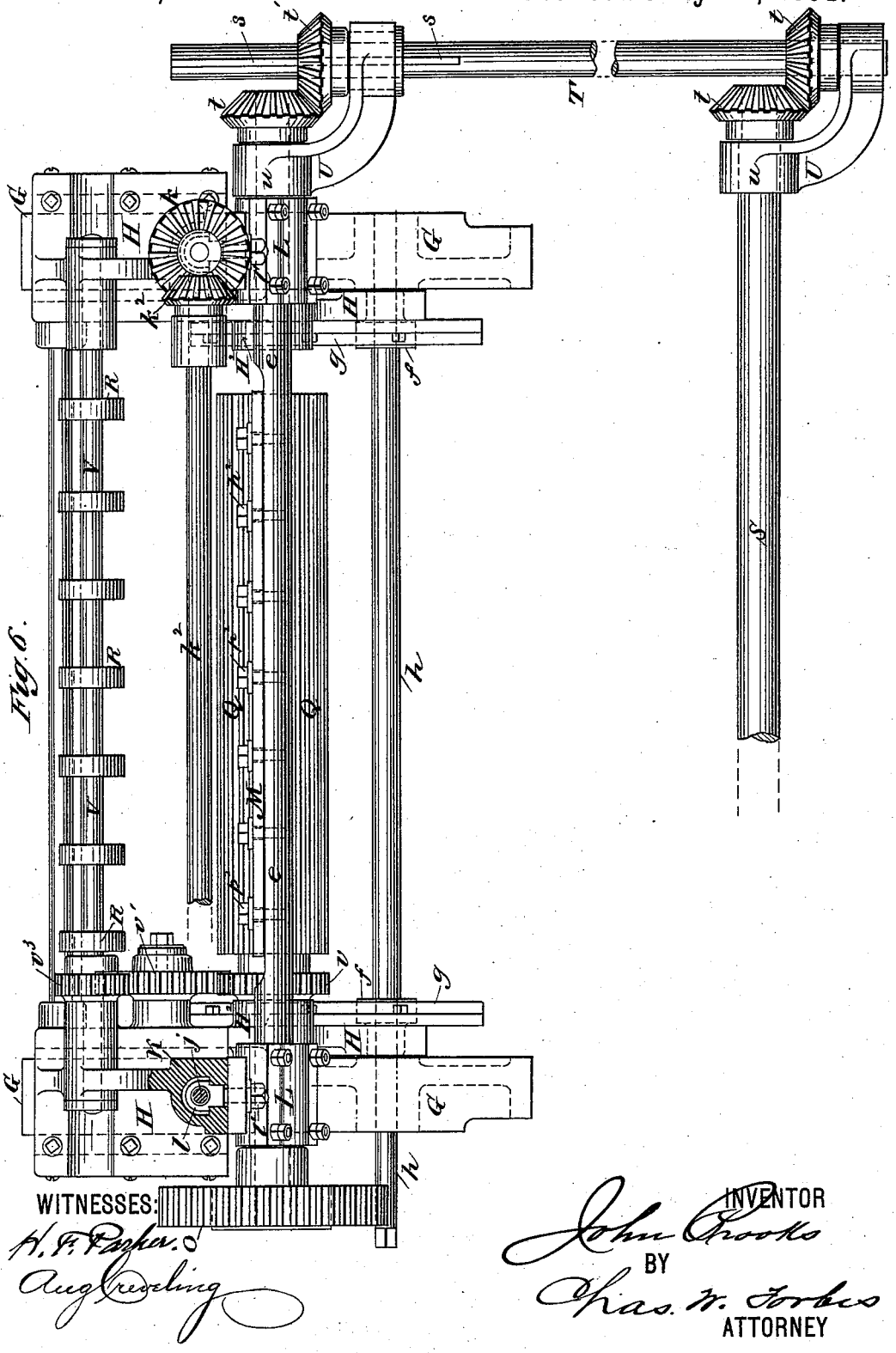

Fig. 6.

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MECHANISM FOR CUTTING OR PERFORATING VARIABLE LENGTHS OF PAPER WEB FOR PRINTING-PRESSES.

SPECIFICATION forming part of Letters Patent No. 456,190, dated July 21, 1891.

Application filed June 23, 1887. Serial No. 242,219. (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 Mechanism for Cutting or Perforating Variable Lengths of Paper Web for Printing-Presses, of which the following is a specification that will enable others skilled in the art to which my invention appertains to understand and use said invention, reference being had to the accompanying drawings.

This invention relates to devices for cutting or perforating sheets of paper in adjustable lengths from a continuous web while the same is being fed into a rotary or other press to be printed.

The object of the invention is to facilitate the adjustment of the paper-cutting mechanism in adapting it for cutting given lengths of sheets and in delivering them so as to register properly by engagement of their leading end with the grippers of the first impression-cylinder or with some predetermined part of the machine.

To this end the invention consists in providing an adjustment of the frame or carriage bearing the rotary cutting mechanism to or from the point of receiving the paper on the first impression-roll in addition to and in co-operation with the radial adjustment of the rotary knife from or toward its axis of rotation, and in means for determining the correct relations of said adjustments. The said radial knife adjustment increases or diminishes the circumference of its path and consequent scoring capacity or periods of cutting or perforating the paper upon the grooved or female cutting-cylinder provided therefor.

The invention also consists in a means of separating the perforated web into sheets subsequent to the act of perforating; and the invention further comprises an arrangement of driving mechanism for the knife and its cutting-cylinder, which is adapted to impart their action irrespective of the various distances at which said knife may be vertically or horizontally adjusted relative to the first impression-cylinder of the press.

Referring to the drawings, Sheet 1, Figure 1 is a side elevation of one of numerous forms of presses, especially rotary presses, to which my invention is applicable; Sheet 2, Fig. 2, an enlarged side elevation of the web-feed and cutting mechanism; Fig. 3, a corresponding view of the carriage of said mechanism, and Fig. 4 a detail section of the cutting-knife; Sheet 3, Fig. 5, a transverse section of Fig. 2 on the line *x x*, and Sheet 4, Fig. 6, a plan view of Figs. 2 and 5.

Similar letters of reference indicate corresponding parts throughout the several views.

Referring to Fig. 1, A A′ are the side frames of a rotary press; B B′, the first and second impression-cylinders, respectively; C C′, the corresponding plate or type cylinders, and D the ink-distributing cylinders disposed in the usual manner, such parts being shown diagrammatically for the purposes of the present description.

E E′ are the tape-rolls carrying the receiving-tapes, and F a guide of the usual construction for directing the leading end of the paper upward, so as to be seized by the grippers F′, such parts—namely, the tapes, guides, and grippers—being ranged in series transversely to the machine.

The side frames G of the cutting mechanism may be cast together with the press-frames A, but are preferably of separate castings bolted to the said frames A, Fig. 2 showing the side frames G detached.

Upon the frames G the horizontally-adjustable carriage H is fitted, bearing the entire paper-feeding mechanism, with the exception of the drum or spool H′, which rests in bearings on the press-frame, the side castings of said carriage H being fitted to the slides I of said frames G, so as to move to and fro. The slides I are inclined in cross-section upon the outer sides thereof, Fig. 5, and the carriage-bearings fitted with gibs *a*, having set-screws *a′*, whereby the carriage is made to fit accurately upon the slides and to be firmly adjusted in place when properly set.

The bearings H^2, carrying the female cutting-cylinder shaft *c*, are extended outwardly at each side of the machine through the slots J, being extended by the bushings *b*, having their upper and lower sides flattened to fit said slots J and assist in steadying and guiding the carriage and shaft *c* at their various points of adjustment. The carriage H is operated in its adjusting movement to and fro by means

of the racks *g* and pinions *f*, arranged on each side of the machine, the said racks being bolted to the carriage-frames, as shown in Fig. 5, and the pinions carried on the shaft *h*, having bearings in the frame G. The said shaft *h* projects out from the side of the machine for the reception of a suitable crank, by means of which the carriage is readily moved. The proper adjustment in inches, say, of this movement of the carriage H for a given length of paper to be cut is determined by means of the scale *i*, placed in view on the side of the frame G, as shown, so that the edge *i'* of the carriage-frame will indicate upon said scale by the various figures thereon the number of inches or fractions thereof of the paper-lengths corresponding to each adjustment, the distance indicated corresponding with the distance of the knife from the grippers of the first impression-roll, so as to register different lengths therewith.

The uprights K of the carriage-frames are vertically slotted on their faced sides at *d* and carry the adjustable boxes L of the rotary cutter-shaft *e*, said boxes being clamped, when properly adjusted upon the slides, by means of T-headed bolts *l*, fitted to said slots, the same being better shown by Fig. 6. Within the T-heads *l* are provided threaded holes for the reception of the adjusting-screws *j*, by means of which the bearings L and shaft *e* are vertically adjusted, the same being moved on either side of the machine simultaneously by means of the miter-gear and horizontal shaft connections *k k' k²*, the shaft *k²* having its end extended, as shown, for the reception of a crank similarly to the shaft *h*. The threaded holes for the reception of the screws *j* may be made in lugs provided therefor upon the bearings L, or in the manner shown, as preferred, in the latter case the bolts *l* being accurately fitted in the flanges of the said bearings. The orbit or stroke of the rotating knife when the latter is set at any position by the adjustment of the bearings L is indicated by means of a scale *m*, graduated in inches and fractions thereof corresponding to the scale *i* and to the lengths of paper to be cut, and an indicator *n* is provided therewith attached to the bearing L. The shaft *e* is made flat at that portion which receives the plate M, bearing the knife N, and said plate M is provided with slots *p*, the said shaft having bolts *p²*, by means of which the knife is colted on the shaft simultaneously with the vertical adjustment of the latter and set or secured at the point of adjustment.

The knife proper (shown enlarged in cross-section by Fig. 4) is clamped between the lower edge of the plate M and the plate N' by means of bolts *o*, the knife-edge being embedded in the rubber or other elastic material *q²*, held in place between the dove-tailed recess or groove formed by the combined plates M and N' and projecting slightly therefrom, so that when the cutting operation occurs the said rubber first catches and holds the web of paper taut over the coinciding groove *q'* of the female cutting-cylinder, and on further rotation of the latter and of the knife the knife-edge is thrust through the outer face of the rubber and parts or perforates the web, the knife-edge being either smooth or toothed, as required.

It is manifest that in order to insure the knife and cutting-cylinder grooves meshing during the cutting operation and also moving at a uniform circumferential or surface speed it is necessary that a substitution of the spur-wheel O shall be made at each change of the cutting capacity. For this purpose a set of interchangeable spur-gears are provided for such substitution, the different radii of said spur-gears at their pitch-line corresponding to the various radii at which the cutting-knife is to be set. The spur-gear O is slid upon a spline *r*, Fig. 1, provided therefor on the shaft *e*, in order to insure the proper coinciding of the knife and cylinder grooves, the pinion P being permanently fixed to the shaft *e*. The teeth of both gears have a pitch measurement which corresponds to the distances between the roll-grooves *q*, in order that one of the latter shall invariably mesh with the knife in the rotation of the latter.

The broken lines O P, Fig. 2, indicate the pitch-lines of the corresponding gears, the same being removed in said figure but shown in Fig. 1.

It is essential to the construction of the cutting-cylinder Q to place the grooves *q* at aliquot distances apart upon the circumference of said cylinder and corresponding with each unit of adjustment of the paper lengths, the grading of said adjustment being extended, for instance, to the half-inch, and therefore the said grooves placed at the said distance apart. The grooves *q* are furthermore made of dovetail form in cross-section, as shown, for the purpose of presenting sharp supporting-edges which shall hold the paper taut for the knife to act on.

The knife-shaft *e*, from which the cutting mechanism and feed rolls or pulleys R are driven, receives its motion from any suitable shaft of the printing-press, as the shaft S, the means for imparting said motion consisting in a counter-shaft T, Figs. 2 and 6, which is fitted at either end with miter-gears *t t'*, one of the latter *t'* being capable of sliding upon the shaft T longitudinally and rotated therewith by means of the spline or feather *s*. The brackets U are swiveled upon the shafts *e* and S, being held thereon by their collars *u*. This arrangement renders the connection self-adapting to the various distances of adjustment of the knife-shaft *e* vertically or horizontally and relative to the shaft S.

The feed rolls or pulleys R may be constructed in the form shown, consisting of a series of pulleys ranged upon the shafts V, or in the form of cylinders extending the breadth of the web. One or both of said rolls or series

of pulleys are preferably constructed with an elastic bearing-surface consisting of a rim of rubber or the like, or with compressible shaft-bearings having compression-springs, the purpose being to clamp or bite upon the paper and draw the same from the spool or drum H′, the latter being retarded by a brake in the usual manner, and to feed the web of paper to the cutter. Rotation is imparted to the feed-rolls by any suitable arrangement of gears v v' v^2 v^3, the gear v having a pitch diameter equal to the diameter of the cutting-cylinder Q.

In the instance of perforation with the knife N the detachment of the web is effected by the excess of speed given to the receiving-tapes E^2, which draw the said web apart and deliver the same to the grippers F′, and thence to its usual course through the press. It is manifest that the speed of the cutting-cylinder Q and feed-rolls will vary according to the size of the spur-wheel O employed; but the speed of the receiving-tapes must in all cases be in excess of that imparted to the web by the cylinder Q in effecting the detachment of said web by said means where the web is perforated.

In the operation of the adjustable mechanism, which is shown in the accompanying drawings as having a capacity for cutting sheets of from twenty-eight to thirty-eight inches in length, the change of adjustment, say from thirty-eight to thirty inches, is effected in the following order: The knife M is first brought to its vertical position in contact with the cutting-cylinder Q and the nuts p^3 loosened. The spur-wheel O is then removed, the nuts l of the bearing-boxes L loosened, and by means of a crank the shaft k^2 revolved so as to lower the said bearing-boxes I until the indicator corresponds to the division of the scale m marked 30. During this movement the knife M remains stationary, while the lowering of the shaft e is permitted by the slots p in said knife, its radius becoming shortened. The several nuts now being reset, and care being taken that the knife coincides with the uppermost cutting-cylinder groove, the substitute spur-gear corresponding to the present knife radius is slid onto the shaft. The carriage is now released by turning the set-screws y and moved by means of turning the shaft h in the manner described until the scale i indicates a corresponding figure (30) to the scale m. The screws y, being then reset, the machine is ready for its altered action.

No claim is herein made to a feeding mechanism having a variable-speed adjustment and a severing device with eccentric gearing for varying its speed to correspond with the speed imparted to the paper.

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

1. In a printing-machine, the combination of the herein-described adjustable rotary knife and cutting-cylinder for cutting (or perforating) variable lengths of paper web, means for registering the sheets delivered therefrom with the grippers of the impression-cylinder, consisting of a movable carriage-frame bearing said cutting or perforating mechanism, and means, as parallel racks and pinions, for moving and adjusting the same toward or from said grippers (and the tapes) in order to effect the adjustment of said carriage-frame for different sheet lengths.

2. In a printing-machine wherein a rotary knife is radially adjustable to or from a cutting-cylinder for cutting (or perforating) paper web into sheets of variable lengths for printing, and the movable carriage-frame bearing said cutting (or perforating) mechanism is adjustable at various distances from some predetermined part of the machine for correct registering of different lengths of sheets, as described, the combination therewith of the indicating-scales pertaining to each of said adjustments, said scales having designations corresponding with one another and with the various lengths of sheets to be cut, (or perforated,) whereby the said adjustments are obtained in proper relation.

3. The combination, with the rotary knife-shaft capable of adjustment to or from the cutting-cylinder and of an independent adjustment to or from the printing mechanism for the purposes described, of a counter driving-shaft, miter-gears, and swivel-brackets, arranged as shown, one of said miter-gears being longitudinally movable but rotatably fixed on said counter-shaft, whereby rotation is imparted from a shaft of said printing mechanism to said knife-shaft irrespective of the various positions of the latter.

4. In a printing-machine, the combination, with a severing device adapted to sever variable lengths of paper, of means consisting of a movable carriage bearing said severing mechanism for registering the sheets delivered therefrom with a predetermined part of the printing-machine, and a moving sheet-conductor interposed between the severing device and said predetermined part, substantially as described.

5. The combination, with a printing-machine and accelerated parting-tapes, of a severing device with means for varying its surface speed but moving at a speed less than the parting-tapes, and a movable carriage for the severing device, substantially as described.

6. The combination, with the impression-cylinder of a printing-machine and accelerated parting-tapes, of a severing device adapted to move at variable speeds, a carriage in which the severing device is mounted, and means for adjusting the carriage to effect the proper registry of the sheets with the impression-cylinder, substantially as described.

7. The combination, with a printing-machine and its accelerated parting-tapes, of a severing device adapted to move at variable speeds, a carriage supporting said severing

device, with means for varying the position of the carriage to obtain the proper registry of the sheets, and feed-rolls with means, such as change-gearing, for changing their surface speed, substantially as described.

8. The combination, with a printing-machine and its accelerated parting-tapes, of a severing device adapted for cutting variable-lengthed sheets, a carriage for the severing device, feed-rolls mounted in said carriage, and means for adjusting the carriage for effecting the proper registry of the sheets with the printing-machine, substantially as described.

9. The combination, with a printing-machine and fixed bearings for a paper roll, of a severing mechanism adapted to variable speeds and mounted in a movable carriage adjustable with respect to some predetermined part of said machine independent of the fixed bearings, substantially as described.

10. In a severing mechanism, the combination of a female cutting-cylinder, a revoluble cutter coacting therewith, gears positively connecting the shafts of the cylinder and cutter together, the gear on the cutter-shaft being a changeable one, and means, substantially as described, for radially adjusting the cutter to accommodate its radius to the size of the changed gear, substantially as described.

11. In a severing mechanism, the combination of a female cutting-cylinder, a revoluble cutter coacting therewith, gears positively connecting the shafts of the cylinder and cutter together, the gear on the cutter-shaft being a changeable one, means, substantially as described, for radially adjusting the cutter to accommodate its radius to the size of the changed gear, and a movable carriage in which the cutting mechanism is mounted, substantially as described.

12. The combination, with a printing-machine, of a carriage adjustable to and from said machine and carrying web feed-rolls and rotary severing mechanism, and means, such as change-gearing, mounted on the carriage for varying the speed of the feed-rolls and the surface speed of the severing mechanism, substantially as described.

13. The combination, in a severing mechanism for a paper web, of a driving-shaft, a rotary cutter driven from said shaft, change-gearing for said cutter, and feed-rolls for the web, the speed of which is also varied by said gearing, substantially as described.

14. The combination, in a severing mechanism for a paper web, of a driving-shaft, a rotary cutter driven from said shaft, change-gearing for said cutter, feed-rolls for the web, the speed of which is also varied by said gearing, and a second set of rolls, as E, having a speed in excess of the feed-rolls, substantially as described.

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