(No Model.) 3 Sheets—Sheet 1.

J. BROOKS.

PRINTING MACHINE.

No. 413,491. Patented Oct. 22, 1889.

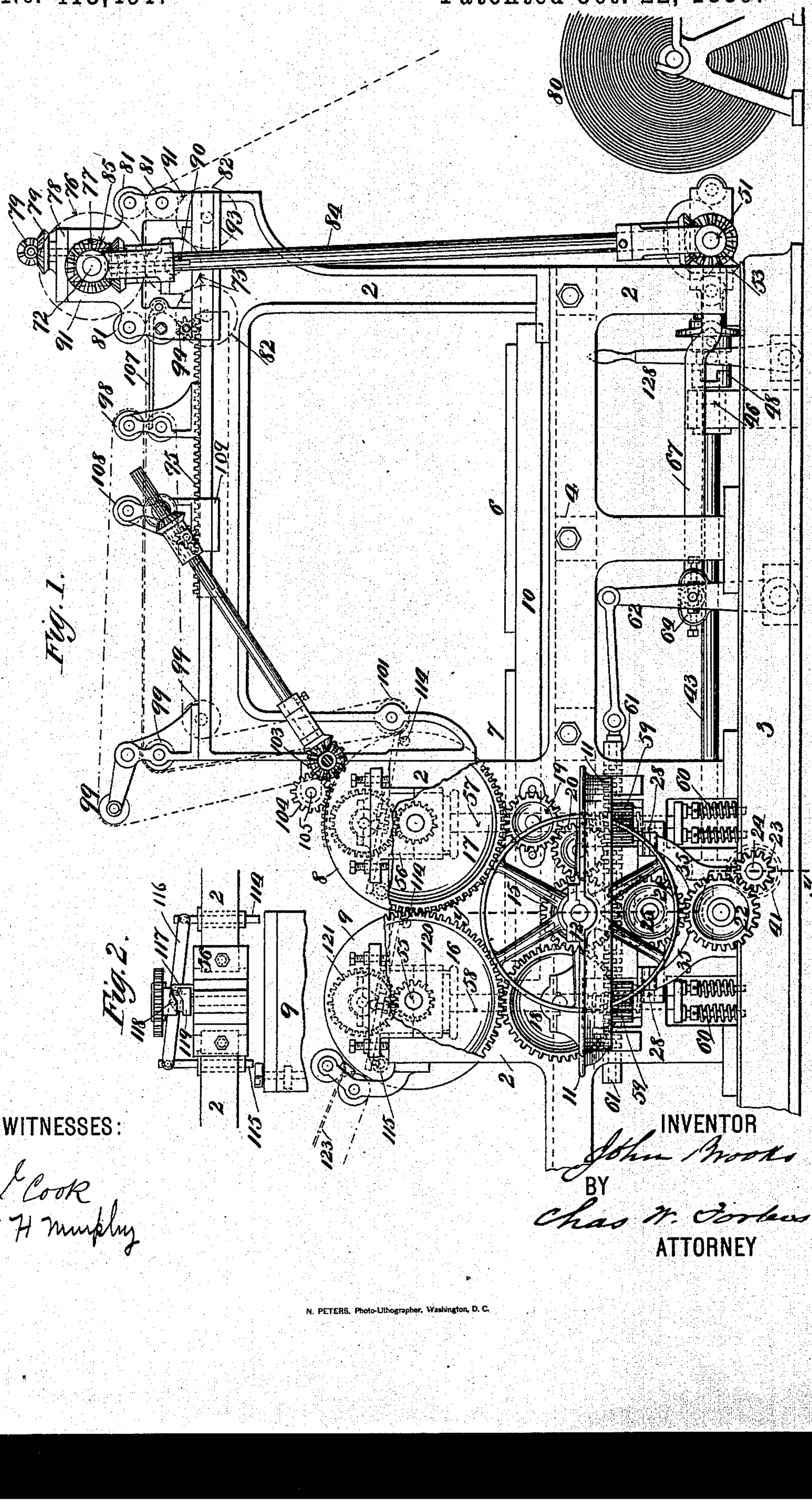

Fig. 1.

Fig. 2.

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(No Model.) 3 Sheets—Sheet 2.

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Fig. 3.

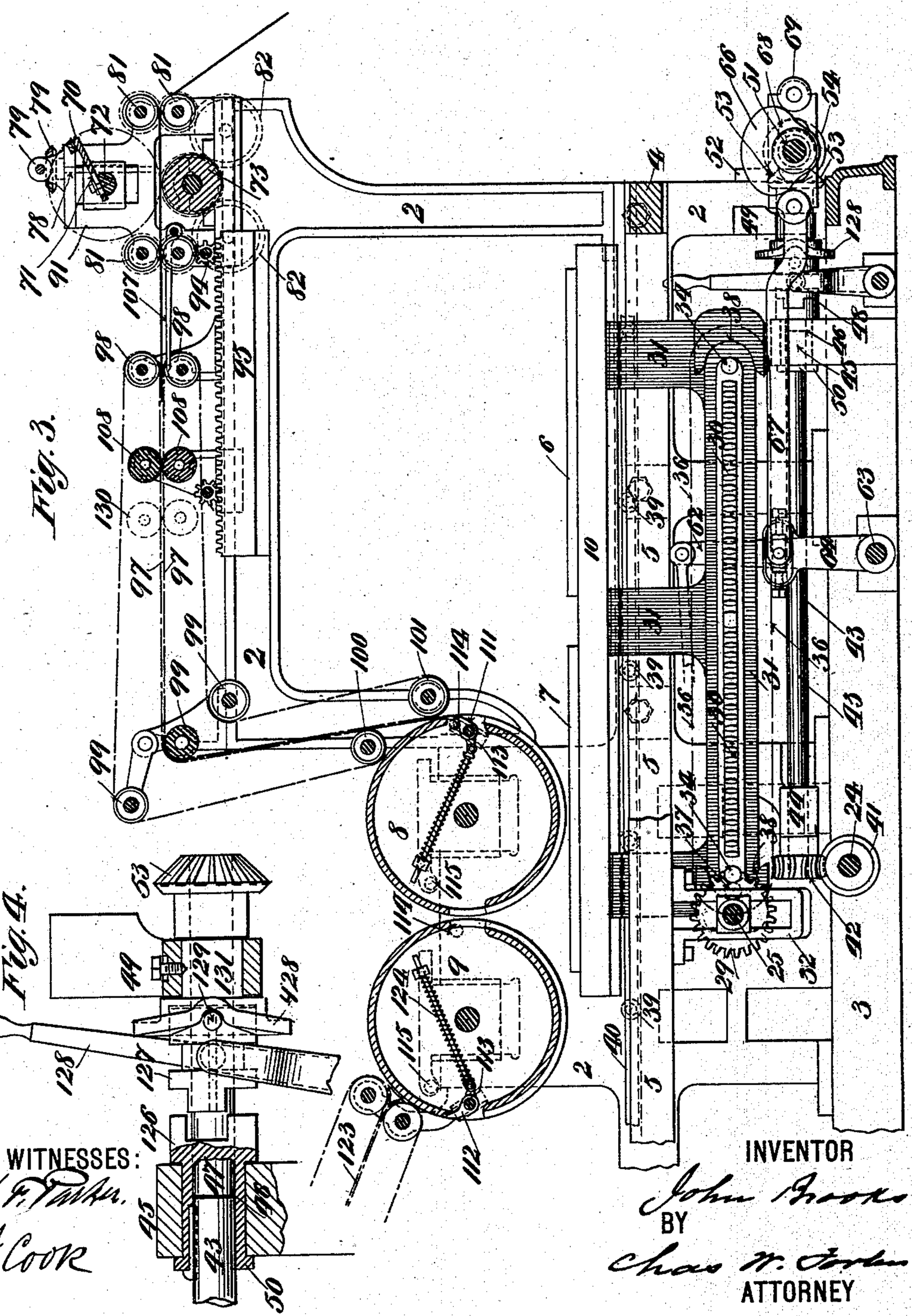

Fig. 4.

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(No Model.) 8 Sheets—Sheet 3.

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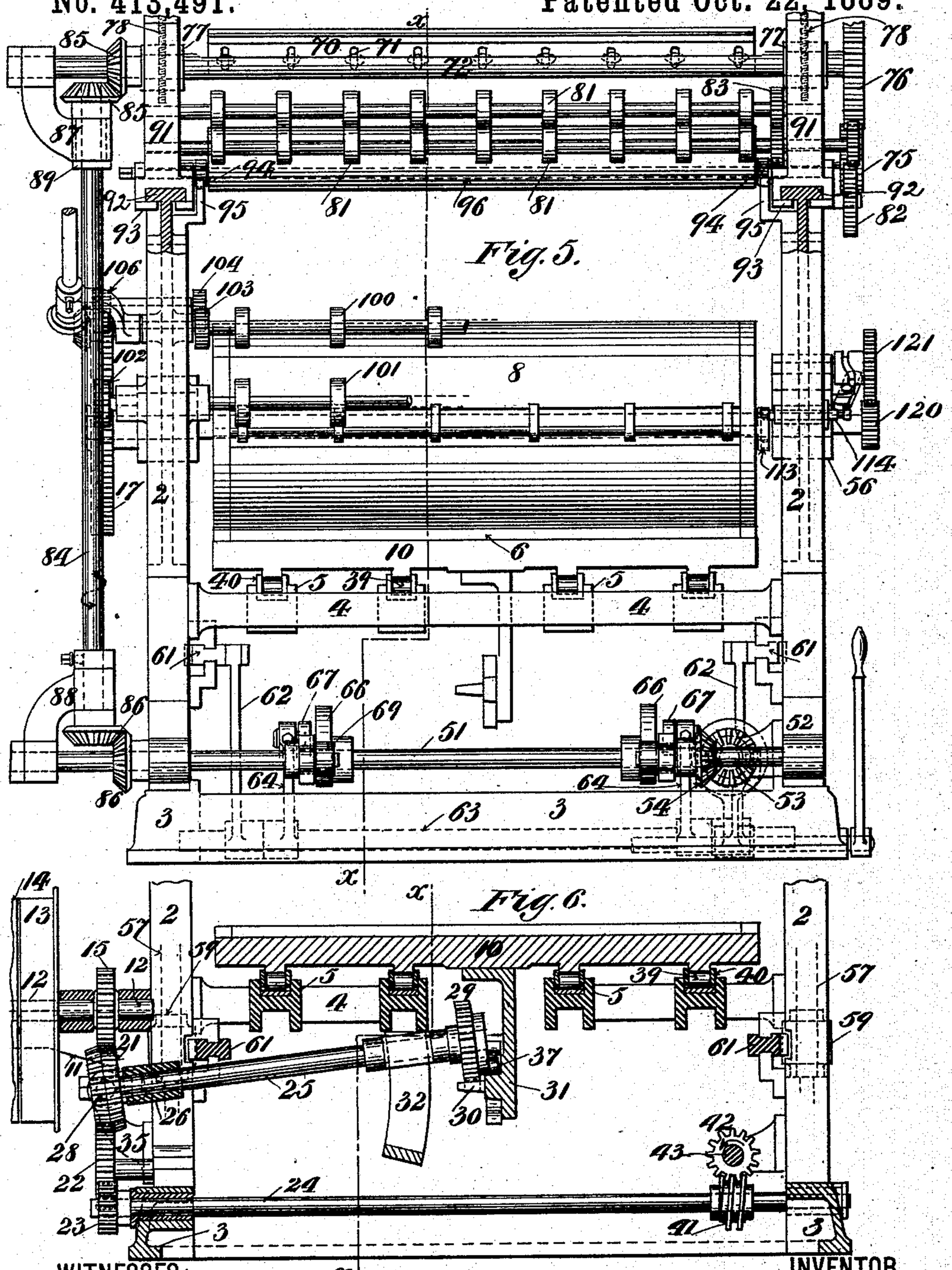

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JOHN BROOKS, OF PLAINFIELD, NEW JERSEY.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 413,491, dated October 22, 1889.

Application filed March 16, 1889. Serial No. 303,595. (No model.)

To all whom it may concern:

Be it known that I, JOHN BROOKS, a citizen of the United States, residing at Plainfield, county of Union, State of New Jersey, have invented certain new and useful Improvements in Printing-Machines, of which the following is a specification.

My invention relates to cylinder presses wherein the type-bed is reciprocative lengthwise and the sheet passes around an impression-cylinder having continuous rotation. In machines thus operated it is essential that the impression-cylinder make two revolutions during the advance and return stroke of the type-bed. The cylinder is elevated by automatic mechanism during the return-stroke of the type-bed, so that the sheet, being carried around twice by the rotation of the cylinder, is permitted to avoid contact with the type-bed after the impression has been made.

My invention consists in a novel combination of parts whereby the web of paper is automatically fed, cut, and delivered to the grippers of the impression-cylinder at the surface speed of the latter at intervals corresponding with every second revolution of such cylinder; and in order that others shall be enabled to understand and use my said invention I will proceed to describe the construction and operation of the devices.

I employ herein in novel combination and point out in the appended claims the features that I claim as new.

Referring to the drawings, in which like numerals of reference denote corresponding parts in the several views, Figure 1 is a side elevation of a printing-machine of the character referred to; Fig. 2, a detail view, shown in plan, of the gripper-operating mechanism; Fig. 3, a sectional elevation taken on the line *x x*, Figs. 5 and 6; Fig. 4, an enlarged sectional view of the clutch employed herein; Fig. 5, an end elevation of Fig. 1; and Fig. 6, a transverse section of the lower part of the machine, taken at the line *y y*, Fig. 1.

2 2 are the side frames; 3, the base of the machine, and 4 the type-bed-bearing frame, having ways 5 5, upon which the platen reciprocates.

I illustrate herewith a double type-bed 10, having forms 6 and 7, corresponding with double impression-cylinders 8 and 9, whereby both sides of a sheet are printed successively, as will hereinafter appear.

11 is a gear-bearing frame projecting out from the side of the machine, bearing the driving-shaft 12, having fast and loose driving-pulleys 13 14, Fig. 6, and having a driving-pinion 15. The pinion 15 is in a common vertical plane with the spur-wheels 16 17 upon the shafts of the impression-cylinders, and imparts motion to them through the intermediate gears 18 and 19 20, respectively. The gears 21 22 transmit motion from the driving-pinion 15 to the pinion 23 of the transverse shaft 24, by which motion is imparted to the cutting mechanism and to the cylinder-elevating mechanism. The gear 21 is upon the vibrating driving-shaft 25 of the type-bed, the bearing 26 whereof is fixed to a swiveled yoke 27, having bearings at 28 28 upon brackets 35, so that the gear 21 is subject to an oscillating motion varying from one side to another of a vertical plane, and its teeth are slightly beveled, as seen in Fig. 6, to accommodate the oscillating motion and to intermesh at all times with the adjacent gears.

The movement of the vibrating shaft 25 for imparting reciprocation to the type-bed, being well known to the art, will be briefly described here. The type-bed is shown at one extreme limit of its stroke in Figs. 1 and 3, the shaft 25 being level; but the latter is shown in an inclined position in Fig. 6 while the bed is performing its stroke. The inner end of the shaft 25 bears a pinion 29, that engages with the double-sided rack 30, supported upon the depending frame 31 of the type-bed. The gear 29 and its shaft are vertically movable in the ways of the segment 32, fixed to the frame 5, a box 33 being provided to slide in the ways of the segment and bear the shaft 25. The pinion 29 has a mutilated tooth or double-width blank space between its teeth at one point of its circumference, which fits a stud 34 at each end of the rack. As the pinion rotates, say, from the position in Fig. 3, it first rises, drawing the rack and type-bed toward it. Then, remaining in the position illustrated in Fig. 6, it propels the rack, describing an orbit relatively to the rack and the type-bed, (indicated by the broken line 36.) Passing thence under the rack at its opposite end, the gear 29 im-

parts the return-stroke of the type-bed. In order to retain the pinion with relation to the stud 34 after it leaves the rack and during its passage around the stud, the said pinion is provided with a second stud 37, fixed in a radius with the mutilated tooth, which stud moves in the semicircular path of the guide-ways 38 at each end of the rack concentric with the stud 34, which latter acts as a pivot upon which the pinion turns upon leaving the teeth at one side of the rack to be transferred to the teeth at the other side.

39 indicates anti-friction rollers borne at the proper distance apart in the movable strips 40 and interposed beneath the type-bed upon its ways to ease the motion. The transverse shaft 24 is provided with a worm 41, which drives the worm-gear 42 and the shaft 43, having bearings at 44 45 within the frame of the machine. Shaft 43 terminates at the point 46, and the shaft 47, adjacent and in line therewith, (see Fig. 4,) is rendered operative or inoperative by the interposed clutch 48, fully described in a separate application filed simultaneously herewith, Serial No. 303,594, but also briefly described hereinafter for purposes of reference to its functions.

51 is a transverse shaft having journals 52, Fig. 5, at each side of the machine, and there are miter-gears 53 54 upon the respective shafts 47 51, transmitting motion from the one to the other.

The elevating mechanism for the impression-cylinders consists, substantially, of that described by me in Letters Patent No. 274,558, and will therefore be but briefly referred to.

The cylinder-shafts 55 55 are journaled in boxes 56, that are vertically movable in guide-ways in the frames 2, as indicated. The boxes 56 are supported (when raised) by vertical rods 57 58, that are screw-threaded, respectively, with right and left screw-threads at those portions which bear the toothed nuts 59. The nuts 59 are sustained against endwise movement by the mortises in which they are located, and sustain the rods 57 58 and the impression-cylinders.

60 are springs that cushion the descending movement of the cylinders.

61 are racks reciprocating in the guides indicated in Fig. 6.

62 are rock-arms fixed to the transverse rock-shaft 63 and connected to the racks by rods 65.

64 are rock-arms whereby the rock-shaft 63 is operated from the cams 66, employed in duplicate upon the transverse shaft 51. The rods 67 are broadened at the end adjacent the cams, and are slotted with slots 68 to guide them in reciprocating over the shaft. The rods 67 also bear anti-friction rollers 69, upon which the cam acts to impart reciprocative motion through the connected parts to the racks 61, thus elevating the cylinders intermittently and alternately.

70 is a rotary cutting-knife similar to that described by me in application for Letters Patent, Serial No. 242,219. The knife 70 is fixed to the shaft 72, being radially adjustable thereon by means of its slots 71 and set-bolts therein for clamping it to the shaft, which is flattened on one side to receive it.

73 is the cutting-cylinder against which the knife acts, the pinion 75 of which is driven by the spur-gear 76, Fig. 4, on the knife-shaft. When the radius of the cutting-knife is changed, the spur-gear 76 is also substituted by another spur-gear to correspond with the altered radius of the knife. The shaft 72 is supported in vertically-adjustable boxes 77, that are raised and lowered by screws 78, operated simultaneously by the miter-gears 79 and a counter-shaft transverse to the machine to accommodate the alterable position of the knife.

80 represents the roll of paper web from which the paper is drawn by the feed-rolls 81 81, and the latter are driven from the cutting-cylinder pinion 75 through the intermediate gears 82 82, the motion being transmitted from one feed-roll to another through gears 83, Fig. 5.

The cutting-knife shaft 72 and its connected mechanism are driven by the counter-shaft 84, receiving its motion from the shaft 51. The shafts 72 84 51 are connected by miter-gears 85 85 and 86 86, the bearings 87 88 of the shaft 84 being swiveled by brackets upon the ends of the shafts 72 and 51, and the upper bearing 87 is provided with a rotary sleeve 89 within it, which bears the miter-gear 85 on the shaft 84, while the latter is lengthwise movable in the sleeve, and has a feather 90 to rotate the sleeve and gear with it.

The frame or carriage 91, bearing the cutting mechanism, is adjustable horizontally on the frame of the press, moving on slides 92, to which the side frames of the carriage are retained by gibs 93, the adjustment being effected by turning the pinions 94, that are located each side of the carriage upon a transverse shaft 96 (shown in dotted lines in Fig. 5) and engage with racks 95, attached to the side frames 2 of the machine. The described movable connection of the miter-gear to the shaft 84 and the swiveled brackets permits the horizontal adjustment of the carriage 91 without interference with the transmission of motion to the cutter and the feed-rolls.

97 97 are tapes or conveying-belts for conveying the sheets from the cutter to the first impression-cylinder 8. The tapes are carried over the several rolls 98 99 100 101, moving in the direction indicated by arrows, as will be understood by an inspection of Figs. 1 and 3. The conveying-belts are driven by the rolls 100 101, the latter bearing a gear 102, Fig. 5, on its shaft that engages directly with the gear 17 of the cylinder-shaft, and the roll 100 bearing a gear 103, that meshes with the gear 104 on one end of an intermediate shaft 105, on the opposite end whereof a gear 106 engages with the gear 17, thereby giving the

proper directions of rotation to the respective rolls 100 101. The elevation of the cylinder and its gear 17, before described, being but slight, does not materially interfere with the meshing of the gear 106 with 17. The journals of the shaft 105 may be made to yield vertically, however, if required.

107 represents one of a series of guides that direct the leading end of the paper to the rolls 98.

The conveying-belts do not seize the sheet, but exert a moderate frictional pressure thereon, moving at the surface speed of the impression-cylinders.

The web is usually perforated rather than cut by the cutting-knife, being separated subsequently. The breaking or parting of the sheets is therefore effected by breaking-rolls 108, which may be adjustable in the line of feed or may be located at a fixed point. I have illustrated the breaking-rolls as adjustable upon a carriage 109, similarly connected with and moved upon the side frames 2, as is the carriage 91 of the cutting mechanism. The breaking-rolls have circumferential grooves upon them corresponding to each conveying-belt, so that the surface of such rolls intermediate to the grooves impinges directly upon the paper and separates the sheet from the web at the arrival of the leading end in the bite of the rolls. The breaking-rolls are geared together and are driven from the shaft of the tape-roll 101 by a counter-shaft 110, having miter-gears and swivel-brackets of a construction corresponding to that described with relation to the shaft 84. Such arrangement of the breaking-rolls is described in detail in my application for Letters Patent, Serial No. 268,079.

The grippers 111 112 of the respective impression-cylinders 8 and 9 have their shafts provided with grooved blocks 113 exterior to the cylinders. The grooved blocks 113 are tripped by engagement with the studs 114 115, Fig. 2, so as to shift the grippers from an open to a closed position, or vice versa, when said studs are brought into alignment with the open ends of the grooves in the blocks. The studs 114 are located at different radial distances from the cylinder-shaft, as indicated, so as to correspond with and pertain to the shifting of the opposite open ends of the grooves in the blocks, namely: In the instance of the cylinder 8, the stud 114, when projected, will enter the end of the block farthermost from the shaft, imparting to the grippers 111 a closing movement, said stud passing out the same end of the block at which it enters, and the stud 115, when advanced, will enter the end of the block nearmost the shaft, imparting to the grippers 111 an opening movement. In the instance of the cylinder 9, rotating in an opposite direction to that of the cylinder 8, the stud 114, when advanced, will enter the end of the block farthermost from the shaft, imparting to grippers 112 a closing movement, while the stud 115, when advanced, will enter the end of the block nearmost the shaft, imparting to the grippers 112 an opening movement.

The studs 114 and 115 are advanced and retracted by means of the lever 116, Fig. 2, fulcrumed at 117 and bearing a stud 118, that fits the groove of a cam 119. The cam 119 is rotated once for each two revolutions of the cylinder to which it pertains by means of the gears 120 121 and the movement is so timed that in starting, say, from the position of the machine in Fig. 3, the grippers of the cylinder 8 seize the head of the sheet as it is delivered from the tapes; the stud 114 being advanced and as in the course of rotation, the grippers come opposite the stud 115, and the latter, being advanced, throws the grippers of the cylinders 8 open. The grippers 112 of the cylinder 9 at this time, being open and opposite the grippers 111, are closed by engagement with the advanced stud 114 of the cylinder 9, the said grippers 112 seizing the head of the sheet as it is released by the grippers 111. In the course of rotation of the cylinder 9 the grippers thereof pass the stud 115, which is withdrawn, thence repassing the stud 114, now retired. The grippers 112 subsequently shift to an open position at their second arrival opposite the stud 115, delivering the sheet to the conveying-belts 123, suitably arranged to take the sheet to the point of final delivery. The grippers are retained in an open or closed position by a spring 125, connected and operated in the usual manner. The shaft 51 and the cutting-knife shaft 72 make one revolution for each two revolutions of the impression-cylinders, cutting one sheet at intervals corresponding with the intervals at which the grippers 111 close at the receiving-point, as in Fig. 3, and the breaking-rolls 108, moving at the surface speed of the impression-cylinders, detach the sheets at a period whereby they will arrive at grippers 111 at the proper time.

In order that the type-beds may be moved to obtain access to them in placing the impression without disturbing the feeding and cutting mechanism and the paper therein, the clutch 48 is provided, making the required disconnection. It is essential, therefore, in disconnecting the cutting mechanism from the cylinder and type-bed-driving mechanism that the clutch 48 shall stop the cutting mechanism at a given point with relation to the movement of the impression-cylinders or reengage the parts in the same relation. It is also essential that both cylinders should remain in a partly-elevated position during such disconnection, which is accomplished by the point of stoppage of the cams 66 at an intermediate position.

Fig. 4 represents the clutch disconnected. The shafts 43 and 47 terminate and abut in the bearing 45. The sleeve 50 forms a part of the clutch-disk 126, being keyed to the shaft 43. The movable clutch-disk 127 is op-

erated by the lever 128, and the disks have a corresponding transverse rib and socket located eccentrically to the shaft, so as to interlock at a single point of rotation. 428 is a cam held stationary by its shank 131, which forms a bushing in the bearing 49. The pin 129, projecting from the periphery of the movable clutch-block, fits the depression shown in one side of the cam, the opposite side of the cam having an elevated surface that prevents the disengagement of the block 127, except when the pin is coincident with the depression. The release of the clutch and the entrance of the pin into the depression is simultaneous, due to the position of the inclined surfaces of the cam with relation to the tooth of the clutch, which do not permit the complete withdrawal of the tooth until the positive arrest of the pin in the depression and stoppage of the cutting mechanism.

In operation the cutter is adjusted to the proper radius to cut the intended length of sheet, the carriage 91 is correspondingly adjusted with reference to the distance of the cutter from the grippers of the first impression-cylinder, and the breaking-rolls 108 are adjusted to deliver the sheets at the proper time. The clutch 48 being released, the machine is started, the ink-distributing-rolls (not shown in the drawings) performing their function preparatory to printing. The clutch is then closed, the cutting and feeding mechanism coming into play with the proper relation to the impression-cylinders. The sheet is carried around the cylinder 8, (on the prominent portion of its circumference,) the cams 66 moving in the direction of the arrow, lowering the cylinder 8 and elevating the cylinder 9, so that the impression is received on the cylinder 8 from the portion 6 of the type-bed. At the half-revolution of the cylinder 8 the head of the sheet is transferred to the cylinder 9, the return-stroke of the type-bed commencing, and both cylinders being partially elevated by a half-revolution of the cams 66 from the position illustrated in the drawings. As the sheet advances under the cylinder 9 the latter is lowered, and the impression received on the opposite side of the sheet from the portion 7 of the type-bed, and as the grippers 112 come opposite the conveying-belts 123 a second time the head of the sheet is delivered to the said tapes, the machine resuming the position in the drawings.

It is to be understood that the features herein claimed are applicable to a single-cylinder platen press, likewise as to the double-cylinder press. It is also to be observed that the breaking-rolls 108 may be permanently fixed at a distance from the cutter corresponding with a maximum length of sheet, as at the position indicated by dotted lines 130, the lineal adjustment of the cutting-point being the sole means of tallying the sheets with reference to the impression-cylinders.

I claim as my invention—

1. In a printing-machine, the combination of a type-bed reciprocative in its plane of impression, an impression-cylinder co-operative therewith having continuous rotation, a gripper mechanism for receiving the head of a sheet at each second rotation of the cylinder, a rotary cutter adjustable at variable distances from the impression-cylinder, conveying-belts for conducting the sheets from the cutter to the grippers of the impression-cylinder, mechanism, substantially as described, for imparting to the rotary cutter a single revolution for each two revolutions of the impression-cylinder, and driving and driven shafts of said mechanism having a clutch that is releasable at a single point of rotation of the driven shaft and of the cutter.

2. The combination, in a printing-machine, of a type-bed reciprocative in its plane of impression, an impression cylinder or cylinders co-operative therewith having continuous rotation, cams and elevating mechanism, substantially as described, for elevating said cylinder or cylinders, a rotary cutter adjustable at variable distances from the cylinder-grippers, mechanism for driving said cams and said cutter at half the rotative speed of the impression cylinder or cylinders, a driving and driven shaft of said driving mechanism connective by a clutch that is releasable at a single point of rotation of the driven shaft, corresponding with which point of rotation the cylinder-elevating cams are at an intermediate position and the rotary cutter is at an inactive position.

3. The combination of a printing mechanism having a rotary impression cylinder or cylinders, and grippers thereon for seizing the paper, a rotary paper cutting and feeding mechanism, and a clutch, substantially as described, for connecting or releasing the said cutting and feeding mechanism and the said printing mechanism at a single point of relation and at the inactive period in the motion of the cutting mechanism.

4. The combination, in a printing machine, of a type-bed bearing the form or forms reciprocative in its plane of impression, an impression cylinder or cylinders having continuous direction of rotation, mechanism whereby the cylinders are advanced or retracted toward or from the type-bed, a rotary paper cutting and feeding mechanism adjustable in its action with definite relation to the printing mechanism, and a clutch for connecting or releasing the cutting and feeding mechanism and the cylinder advancing and retracting mechanism with the cylinder and type-bed-driving mechanism at a single point of relation, as specified.

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