

(No Model.)

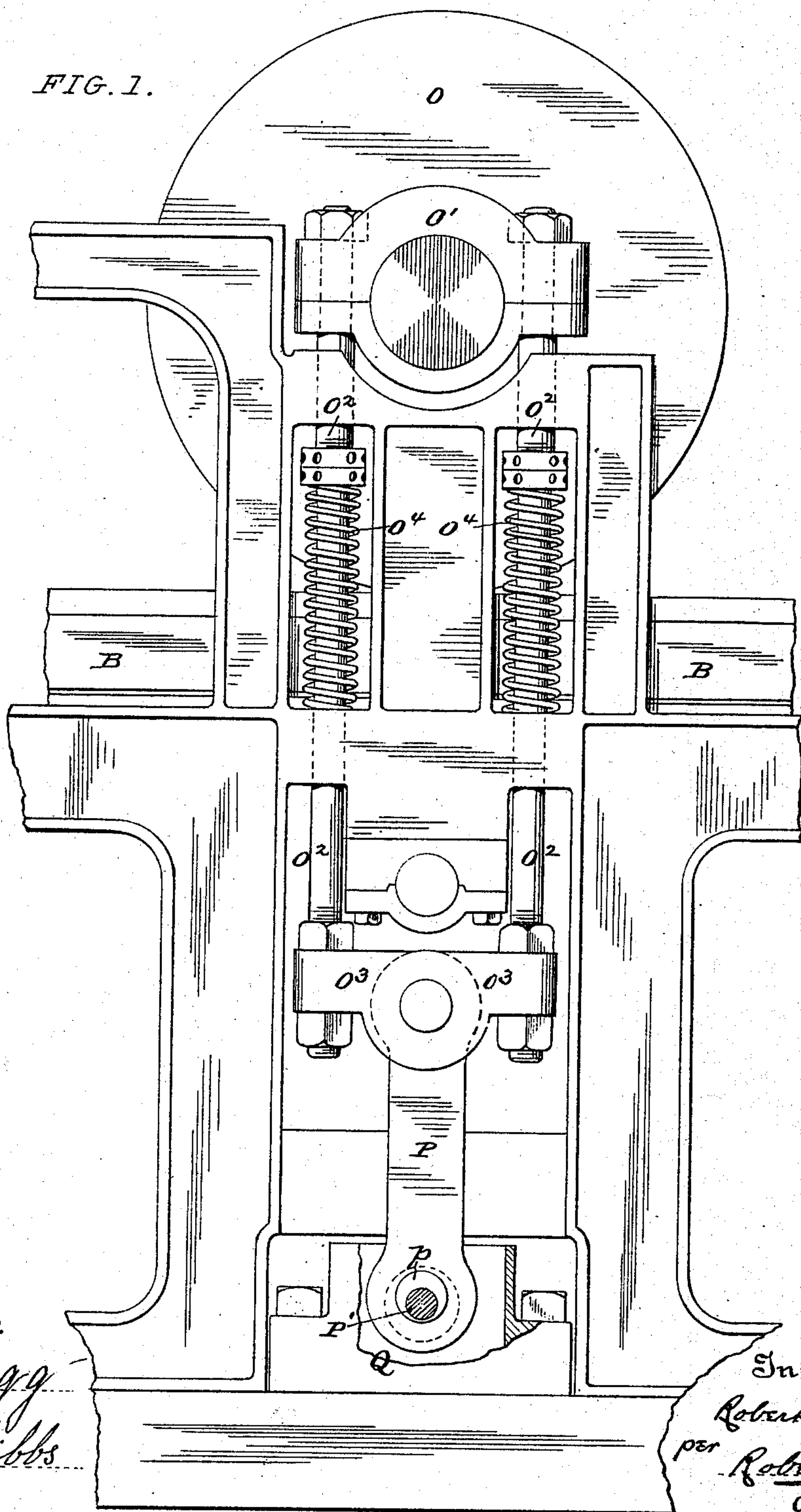
7 Sheets—Sheet 1.

R. MIEHLE.
PRINTING MACHINE.

No. 322,309.

Patented July 14, 1885.

FIG. 1.



Attest:

I. Begg
P. L. Gibbs

Inventor:

Robert Miehle
per *Robert Perry*
Attorney.

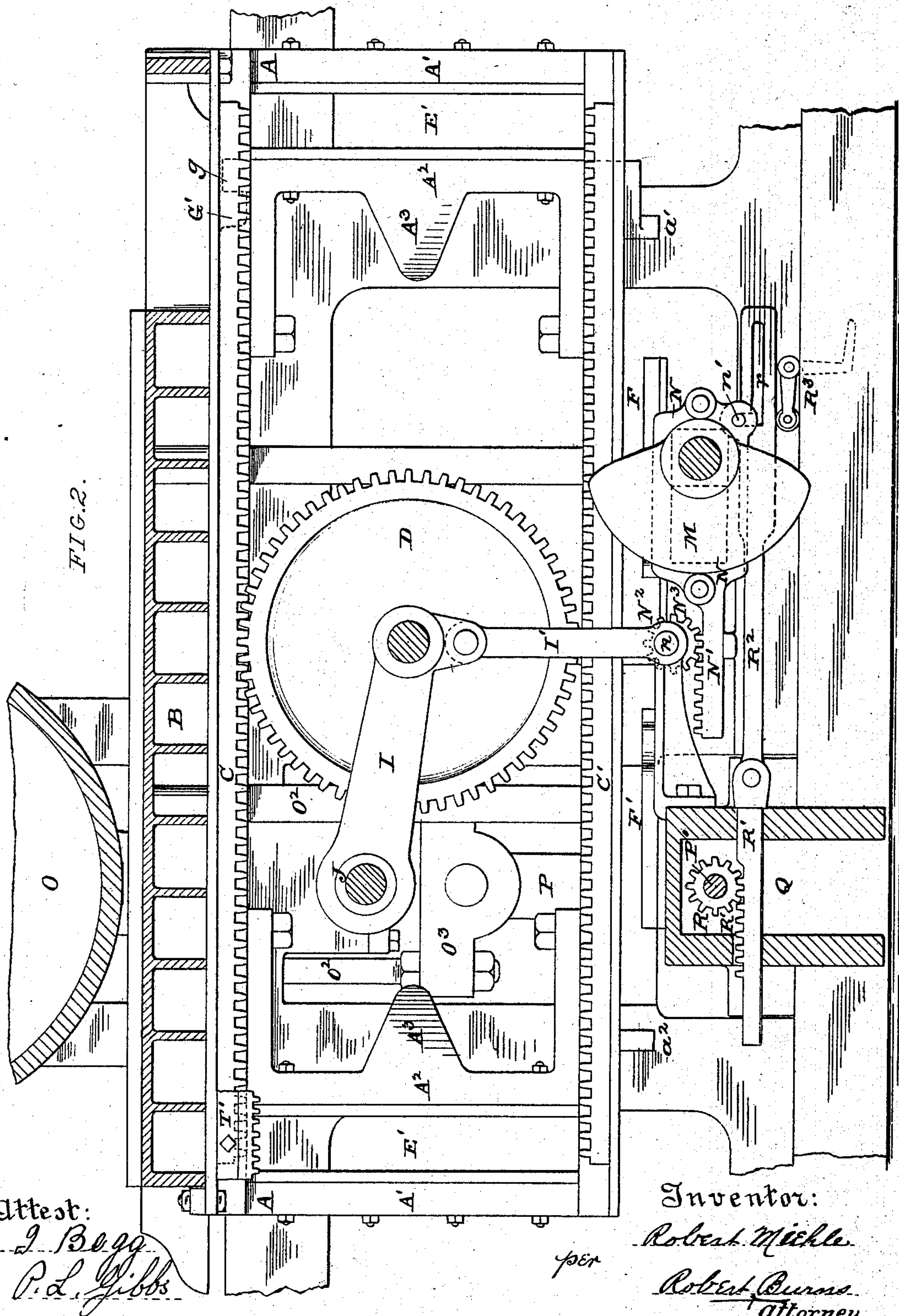
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R. MIEHLE.
PRINTING MACHINE.

No. 322,309.

Patented July 14, 1885.



Attest:

L. Begg
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per

Inventor:

Robert Miehle

Robert Burns
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(No Model.)

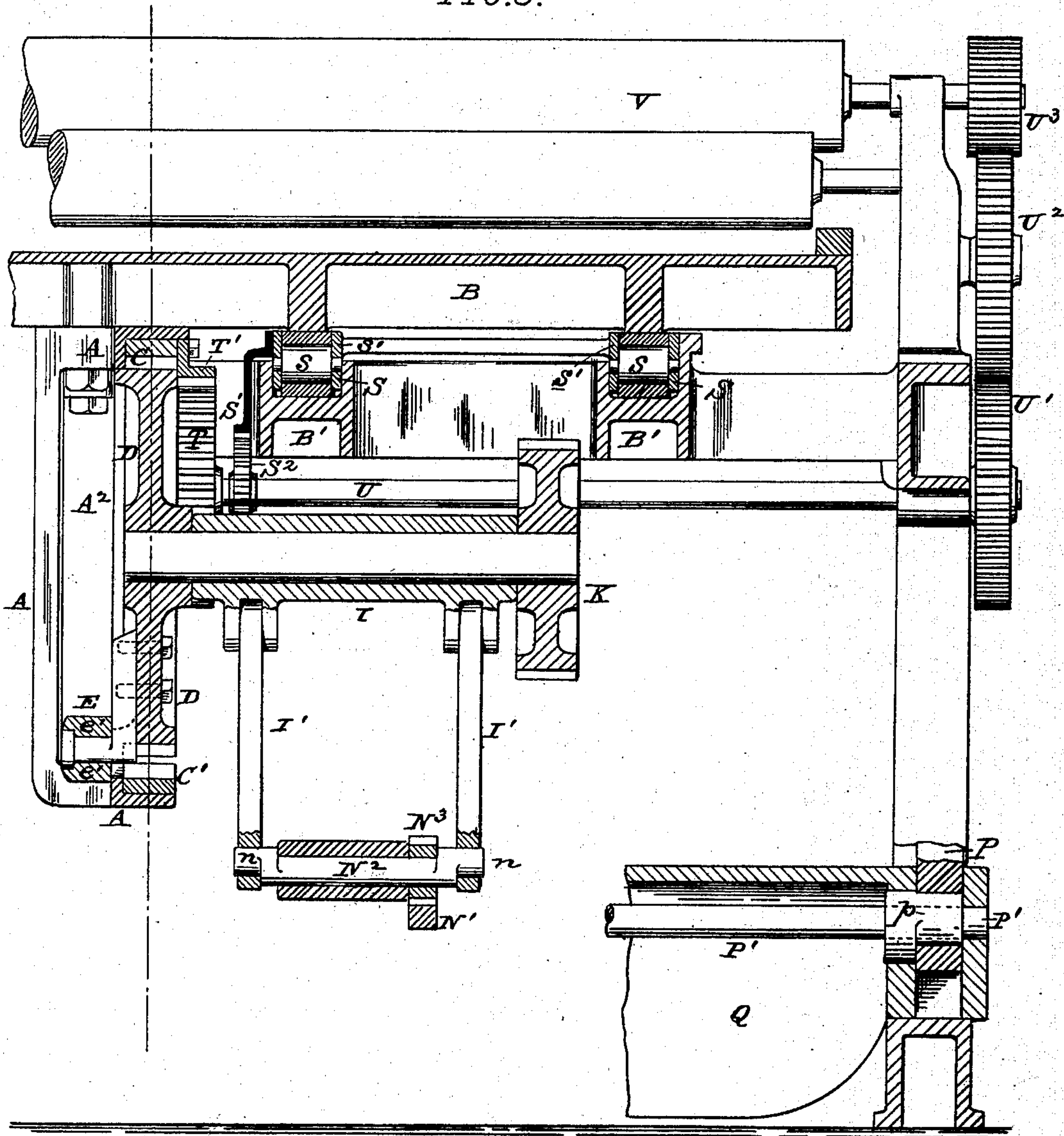
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R. MIEHLE.
PRINTING MACHINE.

No. 322,309.

Patented July 14, 1885.

FIG. 3.



Attest:

J. Begg

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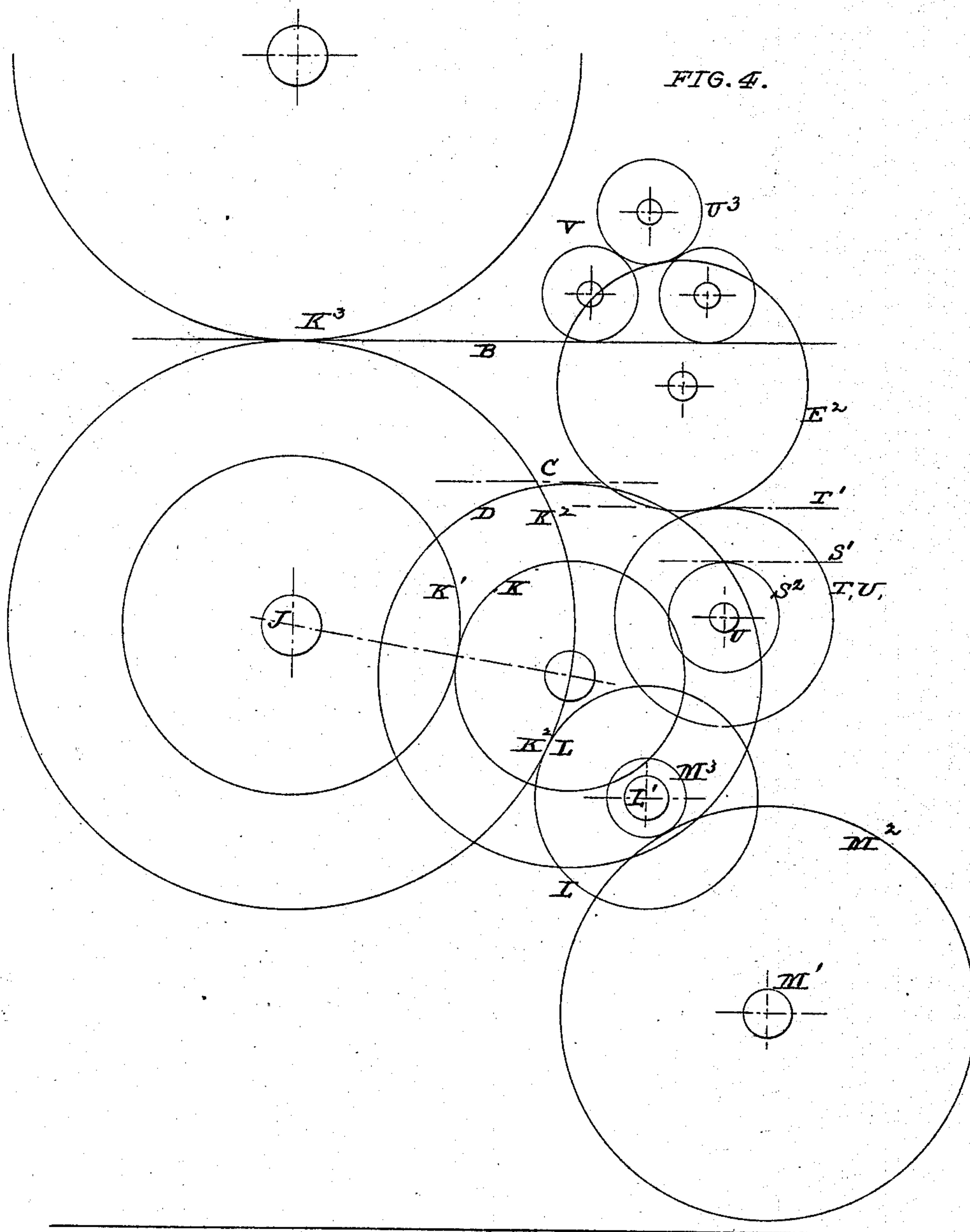
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R. MIEHLE.
PRINTING MACHINE.

No. 322,309.

Patented July 14, 1885.



Attest:

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(No Model.)

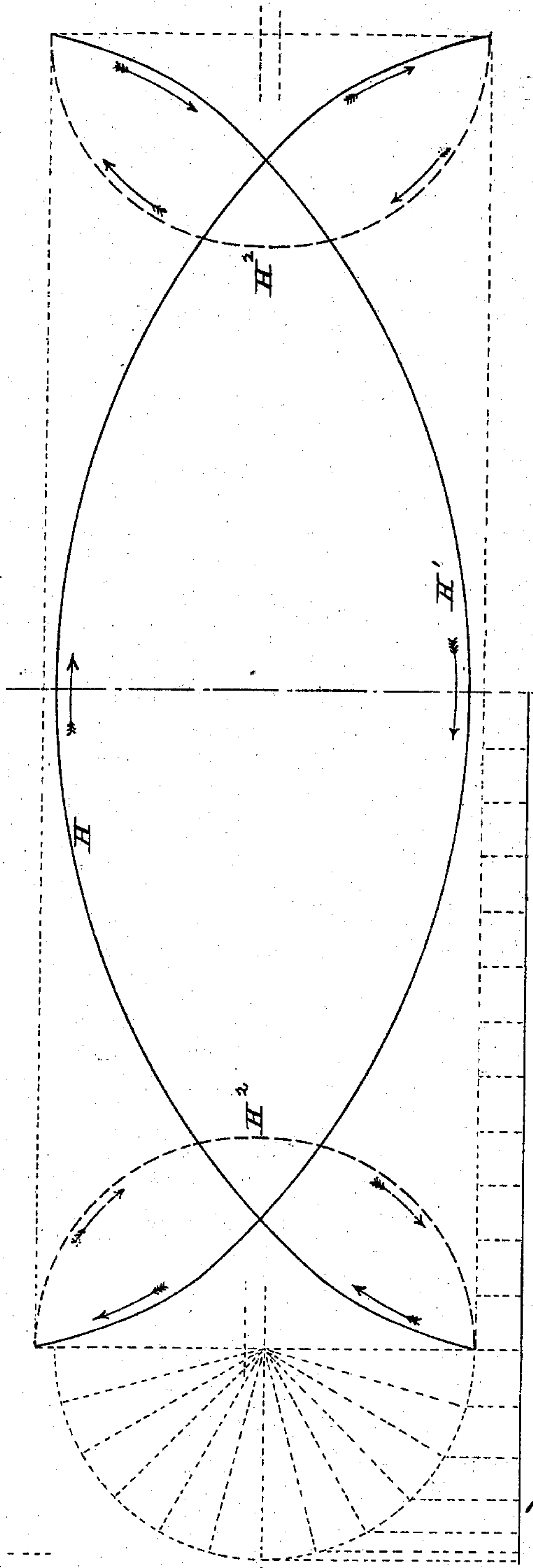
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R. MIEHLE.
PRINTING MACHINE.

No. 322,309.

Patented July 14, 1885.

FIG 5.



Attest:

I Begg
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per *Robert Quinn*
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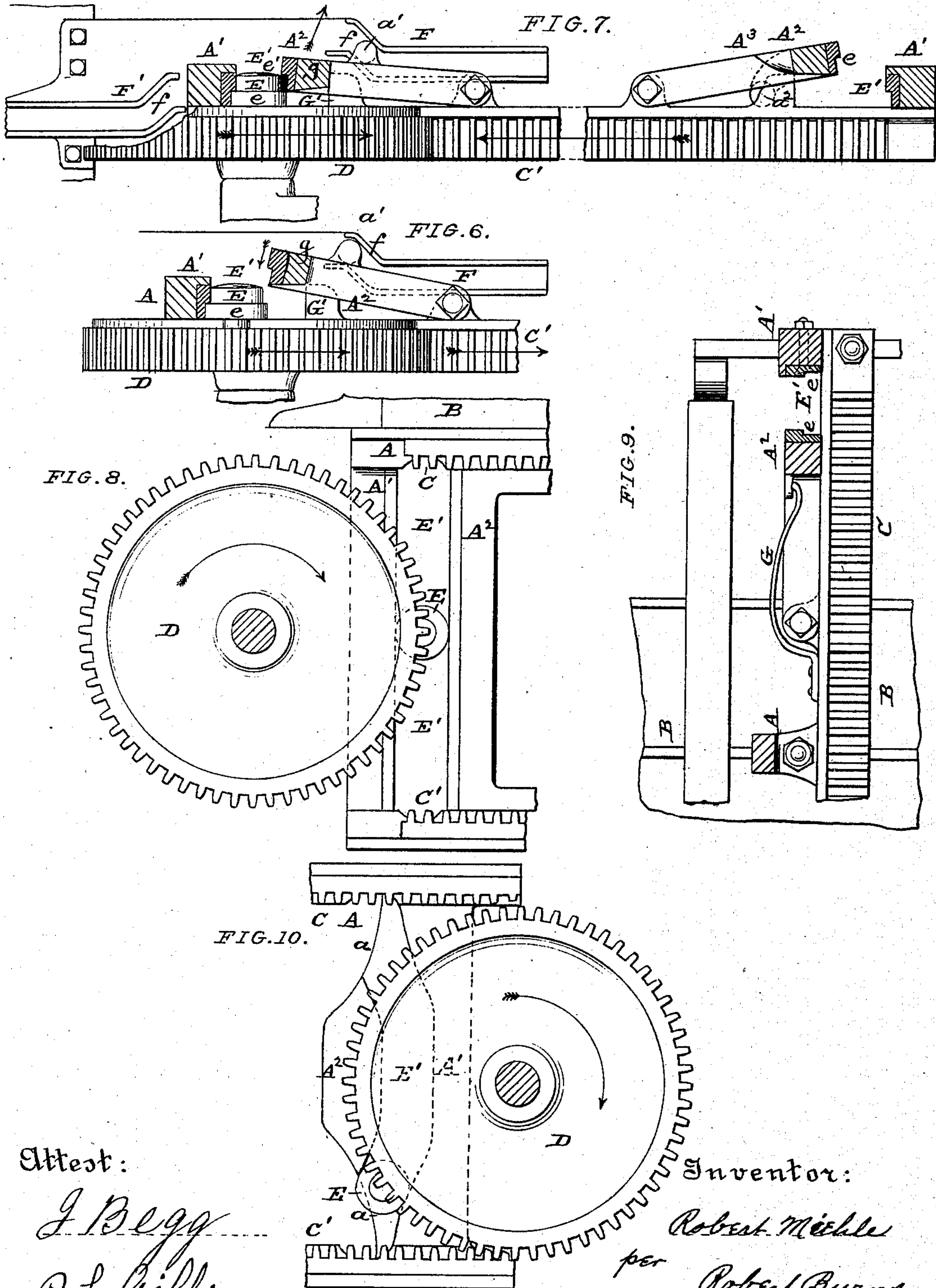
(No Model.)

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R. MIEHLE.
PRINTING MACHINE.

No. 322,309.

Patented July 14, 1885.



Attest:

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P. L. Gibbs

Inventor:

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(No Model.)

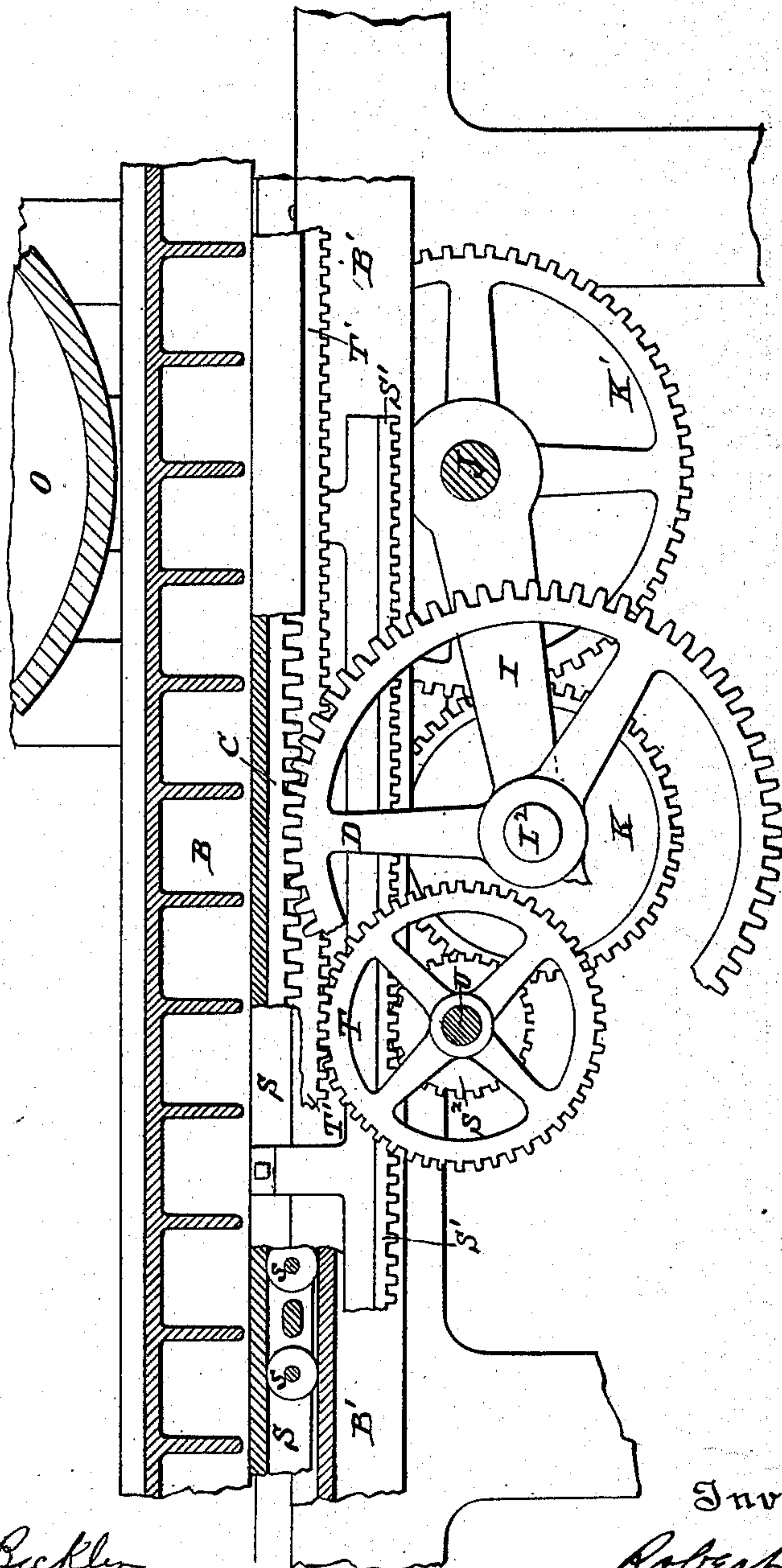
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R. MIEHLE.
PRINTING MACHINE.

No. 322,309.

Patented July 14, 1885.

FIG. 11.



Attest:

Ashlin J. Buckler
Jno R Lane.

Inventor:

Robert Miehle
by Robert Burns
Atty.

UNITED STATES PATENT OFFICE.

ROBERT MIEHLE, OF CHICAGO, ILLINOIS.

PRINTING-MACHINE.

SPECIFICATION forming part of Letters Patent No. 322,309, dated July 14, 1885.

Application filed February 2, 1884. (No model.)

To all whom it may concern:

Be it known that I, ROBERT MIEHLE, a citizen of the United States, and a resident of the city of Chicago, in the county of Cook and State of Illinois, have invented certain new and useful Improvements in Printing-Machines, of which the following is a specification.

My invention relates to that class of printing-presses in which the "form" is carried upon a bed having a reciprocating movement under the impression-cylinder; and my improvement has for its objects, first, to provide an accurate, durable, and very evenly-working "bed-motion" for reciprocating the type-bed, and at the same time effect a very gradual reversal of such motion, and thereby permit of a very high speed being attained without unnecessary wear or jar of the parts; second, to afford means for avoiding side strains upon the driving mechanism due to the connection of the inking-rollers, the anti-friction sliders, &c., to the type-bed, and the driving therefrom of such rollers and sliders; third, to afford means for imparting a reduced positive motion to the slider-frame carrying the anti-friction rollers, upon which the type-bed moves and is supported directly from the rack which imparts motion to the gearing to operate the inking-rollers; fourth, to supply means for automatically raising the impression-cylinder from contact with the reciprocating type-bed during the forward movement of said bed, and for automatically lowering said cylinder before the succeeding backward movement of the type-bed takes place; fifth, to afford means for tripping the cylinder-raising mechanism at will, so as to render it inoperative, with the cylinder in its raised position during the distribution of ink, failure to feed a sheet of paper to the impression-cylinder, &c. I attain these objects by the mechanism illustrated in the accompanying drawings, in which—

Figure 1 is a side elevation of a portion of a printing-press illustrating a portion of my improved mechanism for automatically raising and lowering the impression-cylinder. Fig. 2 is a vertical longitudinal section of a portion of a printing-press, showing the general arrangement of my improved mechanism. Fig. 3 is a transverse section of the

same. Fig. 4 is a diagram view illustrating the position, &c., of the different shafts and gears employed to impart motion to the different parts of the press. Fig. 5 is a diagram view illustrating the curve that would be traced by the wrist-pin of the rack-pinion upon the frame of the bed-rack in the movement of the one past the other, and also the gradual reversing movement that is imparted to the bed by said wrist-pin. Fig. 6 is a detail horizontal section illustrating the mechanism for automatically moving the swinging end shoes of the bed-rack into and out of the path of the wrist-pin of the rack-pinion, the view illustrating one of the shoes in position ready to be pushed into the path of said wrist-pin previous to its reaching a position to complete in a gradually-decreasing manner the movement of the type-bed. Fig. 7 is a similar view illustrating the end shoe being pushed out of the path of the wrist-pin after movement has been imparted to the type-bed by the movement of the wrist-pin between the end shoes of the rack-frame. Fig. 8 is a detail side view of one end of the bed-rack and operating-pinion, illustrating the position of the parts at a full stroke of the type-bed, and just as the movement of such bed is being reversed. Fig. 9 is an inverted horizontal section of the rack-frame, illustrating the means employed for attaching the rack-frame to the under side of the type-bed; and Fig. 10 is a detail side view of a modified form of the bed-rack and end shoes. Fig. 11 is a detail vertical section through bed of press, showing the gearing between the bed and slider-frame.

Similar letters of reference indicate like parts in the several views.

The first part of my present invention relates to the means employed to impart motion to the type-bed of the press uniform with that of the periphery of the impression-cylinder, and during the passage of such bed under said cylinder, after which a progressively-decreasing velocity is imparted to the bed until the point of reversal is reached, when a progressively-increasing velocity is imparted to the bed until the degree of uniform velocity is again reached.

Referring to the drawings, A represents a rack-frame fixedly secured to the under side of the reciprocating type-bed B, and provided

with top and bottom toothed racks, C C', with which the driving-pinion D alternately gears, the racks being set far enough apart to permit of a vertical movement of the pinion D into and out of gear with such racks in order to alternately drive the same and attain a reciprocating movement of the type-bed by a continuous rotation of said pinion. The reciprocating motion of the type-bed with a velocity uniform with that of the periphery of the impression-cylinder is attained by the meshing with and driving of these racks alternately by the pinion D, the reversing of such motion of the type-bed in the gradual manner above mentioned being attained by a wrist-pin, E, upon the driving-pinion D, which automatically enters a vertical groove or slot, E', formed by the shoes A' A² at each end of the rack-frame. The wrist-pin in effecting this part of the bed motion will cause the bed to move progressively slower until a horizontal center of the wrist-pin is reached, when the motion is reversed, and continued in an opposite direction, and with a gradually increasing velocity until the rack is moved into gear with the driving-pinion to continue the movement with a uniform velocity.

In the construction illustrated in the drawings, the parts are so proportioned that the driving-pinion makes three complete revolutions during the forward and backward movement of the type-bed—i. e., one revolution to each rack C C', and one-half revolution in each vertical end slot, E'. Still I do not limit myself to such proportion of parts, as it may be changed materially without departing from the spirit of my invention—for instance, the driving-pinion may make two complete revolutions to each rack, and one-half a revolution in each end slot, E'.

The vertical end slots or grooves, E', may be formed in the manner shown in Fig. 10, the inner shoes, A², being cut away at *a* to permit of the entrance of the wrist-pin E into the slot E' between the shoes A' A², so as to effect the completion and reversal of the movement of the type-bed. With this construction the top and bottom of the shoes should be formed upon the cycloid curve traced by the wrist-pin upon the rack-frame to insure the return of the rack-frame properly into gear with the driving-pinion.

While excellent results are attained by the above arrangement of shoes, still it is preferable, both on account of cheapness in repair, durability, &c., to make the shoes of a straight form, with the inner ones, A² A², arranged to swing into and out of the path of the wrist-pin E, such motion being imparted to the shoes by means of the horizontally-inclined grooved plates F F', of which there are one for each shoe, the one, F, for the rear shoe being arranged forward of the vertical axis of the driving-pinion, and the one, F', for the forward shoe to the rear of such axis.

The operating-slots *f f* in the plates F F',

in which the guide-pins *a' a²* of the shoes A² engage, are so formed as to move its shoe into place behind the wrist-pin E after it first enters the vertical slot E' and hold the shoe in such position until the wrist-pin, in its semi-circular sweep within the slot E', reverses the movement of the bed, when the shoe is pushed outward (see Figs. 6, 7, 8 and 9) to permit the wrist-pin to move out of said slot E', the wrist-pin E remaining idle while the pinion is in gear with its racks to effect the main movement of the type-bed, and coming into action when such pinion is about leaving its racks, so as to gradually reverse the motion of the bed and return the racks into gear with the pinion. The pinion D in moving the type-bed forward engages the top rack, C, and in moving the bed backward engages the bottom rack, C'.

G is a spring connected to each movable shoe, the tendency of which is to move and hold such shoes out of the path of the wrist-pin E. (See Fig. 9.)

A³ are inclined inwardly-facing offsets, against the inclined face of which the wrist-pin E strikes to move the shoes out of its way in case of the failure of the spring G to hold such shoe out of the way. (See Figs. 2 and 7.)

G' are stop-lugs or offsets upon the rack-frame, to form abutments for the projecting lugs or offsets *g* on the movable shoes A², to take the strain off the pivot-bolts of the same. (See Figs. 2 and 7.)

In Fig. 5 I illustrate the movement of the wrist-pin E in relation to the rack-frame, on which it would trace the cycloid curves H H' during the movement of the rack-frame and type-bed by the pinion D, the curved lines H² indicating the sweep of the wrist-pin in the end slots E', Fig. 2. From this diagram it will be observed that the wrist-pin has but very little longitudinal movement in entering and leaving the vertical slots E', and does not interfere with the movement of the shoes A² into or out of the path of such pin at the proper moment; and to further avoid any such interference I form the wrist-pin and the shoes with a series of two or more offsets or steps, *e*, in order to insure a quicker clearance of the parts, as clearly indicated in Figs. 6 and 7.

It is preferable to arrange the axis of the wrist-pin E at the pitch-line of the driving-pinion, and to provide it with an anti-friction sleeve or thimble, *e'*, to avoid wear. The said wrist-pin is preferably provided with a right-angled offset, by which it is bolted into a recess in the side of the rack-pinion D, as indicated in Fig. 3.

In order to attain a vertical movement of the rack-driving pinion D, so as to alternately gear with and drive the racks C C', I journal the same by means of a journal pin or shaft, I², at the free end of a rock-arm, I, that is journaled on the shaft J of the intermediate gears K' K², that are driven by a spur-pinion, L, on the main driving-shaft L', the

pinion L gearing with spur-wheel K^2 , motion therefrom being communicated to the rack-pinion through the gears K' K.

Motion is imparted to the impression-cylinder O through gear K^3 from the gear K^2 , as indicated in Fig. 4.

The proper intermittent oscillatory movement of the rack-driving pinion D is effected automatically by the following means: M is a cam keyed on the shaft M' , that receives motion through gear M^2 from the pinion M^3 on the main shaft L' . The face of this cam is formed as shown, so as to impart an intermittent back and forward motion to the cam-yoke N, which is in turn transmitted to the rock-arm I by a rack, N' , secured to the yoke, imparting motion to a semi-rotary crank-shaft, N^2 , through pinion N^3 , the crank-pins n of which carry and impart an intermittent rising and falling motion to the connecting-links I' of the rock-arm I and driving-pinion, as indicated in Figs. 2 and 3.

In some cases, where greater simplicity is required, the cam-yoke N may be connected to and impart motion direct to the rock-arm of the rack-pinion D.

The mechanism for accomplishing the above-described movement of the rack-pinion is also utilized to intermittently raise and lower the impression-cylinder in the following manner: The boxes O' , in which the impression-cylinder is journaled, are supported on rods O^2 that pass through and are guided by holes in the side frames of the press, as shown in Fig. 1, and which are connected together at their lower ends by cross-heads O^3 , to which are pivoted the links P of the operating cranks or eccentrics p , upon the outer ends of the transverse shaft P' . This shaft is supported in bearings in the cross-piece Q of the frame of the machine, as shown in Fig. 3, and carries a pinion, R, meshing with a rack, R' , from which it receives a semi-rotary movement. The rack R' is connected by a link, R^2 , to the cam-yoke N, so as to receive motion therefrom.

In order to render the above-described vertically-intermittent movement of the impression-cylinder inoperative during the distribution of ink, &c., I form the connecting-link R^2 with an L-shaped slot, r , as shown, so that by lifting the forward end of said link upward by means of the foot-operating bell-crank lever R^3 , the vertical portion of said slot will be lifted out of engagement with the operating-pin n' on the cam-yoke, and said pin will be then free to move along the horizontal part of the slot r without imparting any movement to the link R^2 . By this construction the impression-cylinder can be left in a raised position.

O^4 are springs surrounding the lifting-rods O^2 , for the purpose of cushioning the vertical movement of the impression-cylinder. (See Fig. 1.)

As indicated in Fig. 3, S are the anti-friction sliders which are interposed between the

reciprocating type-bed and its ways B' , upon the frame of the machine, and consist of a series of anti-friction rollers, s , journaled in a frame, s' . In order to hold these sliders to the proportionally-reduced motion imparted to them by the bed, I provide the ways with a rack, S, (see Figs. 3 and 11,) and one-half the length of the stroke of the type-bed. In this rack engages a pinion, S^2 , one-half the diameter of the gear T, that meshes with a rack, T' , the full length of the stroke of the type-bed, to which it has attachment by being secured to the side of the main driving rack-frame, as indicated in Figs. 2, 3, and 11.

The shaft U that carries the rack-gear T is also employed to communicate motion through gears U' U^2 U^3 on the outside of the press to the inking-rollers V of the type-bed, as indicated in Figs. 3 and 4.

By my improved arrangement of mechanism I am enabled to locate the driving mechanism at the longitudinal center of the type-bed, and take the different movements for the sliders and inking-rollers from or near such center, and thereby entirely avoid all side strains upon the type-bed and its supports, and thus render its action more even and uniform. This improvement further permits of a pair of duplicate air-cushioning pistons and cylinders being arranged equally at each side of the longitudinal center of the type-bed, so as to cushion the same in a more even and uniform manner and prevent side strains in the movement of said bed.

In the practical construction of my improvement I prefer to form the faces of the shoes A' A^2 by adjustable liners or strips, as indicated in Figs. 2, 6, 7, 8, and 9, so as to permit of the "taking up" of wear as it occurs.

The diagram Fig. 4 represents the relative position of the different shafts with the pitch-lines of the gearing and racks used to transmit motion from one part to the other. In this view L' is the main driving-shaft, communicating to the impression-cylinder through gears L K^2 K^3 , and also to the shaft M' of the cam, by which the bed motion is reversed and the cylinder raised and lowered through pinion M^3 and spur-gear M^2 .

Motion is communicated to the rack-driving pinion D from the shaft J of the gear K^2 through gears K' K.

C is the upper bed-rack, and T' the supplemental bed-rack, connected through gears T and pinion S^2 upon a shaft, U, to the rack S' upon the slider-frame. A gear-wheel, U' , of the same size as the gear T upon the shaft U, serves to transmit, through gear-wheel U^2 and pinion U^3 , motion to the topmost of the inking-rollers.

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

1. In a bed-motion for printing-presses, as herein described, in which the bed is operated by a pinion that engages alternately with top and bottom racks attached to the press-bed,

the combination of the operating-pinion provided with a wrist-pin, E, with the rack-frame provided with a vertical guide-slot, E', at each end for the purpose of properly guiding the
5 pinion into gear with the racks, essentially as set forth.

2. The combination, with the reciprocating bed of a printing-press, of a rack-frame having racks C C' and vertical end slots E' E',
10 driving-pinion D, provided with a wrist-pin, E, and mechanism, substantially as herein described, for alternately engaging the pinion D with the upper and lower racks, C C', essentially as set forth.

3. In a bed-motion for printing-presses, essentially as herein described, the racks C C', inner end shoes, A² A², hinged to the rack-frame, mechanism substantially as herein described, for automatically moving said shoes
20 into and out of the path of the wrist-pin E upon the driving-pinion of the bed-racks C C', all combined essentially for the purpose set forth.

4. The combination, with the reciprocating bed of a printing-press, of a rack-frame having racks C C' and vertical slots E' E', driving-pinion D, carrying the wrist-pin E, said pinion being journaled at the end of a rock-arm, I, and receiving a continuous rotary motion through gears K K', and an intermittent rising and falling motion from cam M, all combined essentially as set forth.

5. In a bed-motion for printing-presses, essentially as set forth, the fixed vertical shoes
35 A' and movable shoes A², provided with pins a' a², in combination with the grooved cam-plates F F', driving-pinion D, wrist-pin E, racks C C', and bed B of a printing-press, essentially as set forth.

6. In a bed-motion for printing-presses, essentially as set forth, the movable shoes A², provided with an inclined-faced offset, in combination with driving-pinion D, wrist-pin E,
40 racks C C', and bed B of a printing-press, essentially as set forth.

7. In a bed-motion for printing-presses, essentially as set forth, the fixed shoes A', movable shoes A², provided with pins a' a², and springs G, in combination with the grooved
50 cam-plates F F', driving-pinion D, wrist-pin E, racks C C', and bed B of a printing-press, essentially as set forth.

8. In a bed-motion for printing-presses, essentially as set forth, the wrist-pin E and
55 shoes A' A², forming the vertical slots E', having their faces formed with offsets e, in combination with the racks C C', pinion D, and bed B of a printing-press, for the purpose set forth.

9. In a printing-press, the combination of
60 the impression-cylinder journal-boxes and vertically-moving guide-rods with connecting-links and rock-shaft, to which is imparted an intermittent movement for raising and low-

ering the cylinder, essentially as herein described. 6

10. In a bed-motion for printing-presses, essentially as set forth, the movable shoes A², provided with stop-lugs g, in combination with the rack-frame A, provided with abutment-lugs G', driving-pinion D, wrist-pin E,
70 racks C C', and bed B of a printing-press, essentially as set forth.

11. In a bed-motion for printing-presses, essentially as set forth, the combination of the
75 bed B of a printing-press, rack-frame A, having racks C C' and vertical slots E', pinion D, wrist-pin E, rock-arm I, link I', crank-shaft N², pinion N³, rack N', cam-yoke N, and cam M, essentially as set forth. 80

12. The combination, with the impression-cylinder O of a printing-press, of the boxes O', lifting and guide rods O², cross-heads O³, links P, shaft P', eccentrics p, pinion R, rack R', link R², and cam and yoke M and N, essentially as set forth. 85

13. The combination, with the impression-cylinder O of a printing-press, of the boxes O', lifting and guide rods O², cross-head O³, cushion-springs O⁴, links P, shaft P', eccentrics p, pinion R, rack R', link R², and cam
90 and yoke M and N, essentially as set forth.

14. In a cylinder raising and lowering mechanism, essentially as set forth, the link R², provided with an L-shaped slot, r, in combination with the cam-yoke N, provided with a pin, n', and bell-crank lever R³, essentially as set forth. 95

15. In a printing-press, the combination of the bed having a rack secured thereon which
100 moves with the bed, for imparting motion to the inking-rollers, and the slider provided with a rack, and reduced gearing for imparting motion to said slider, the parts being arranged so that both the sliders and inking-rollers are operated by the same rack which moves with the bed, substantially as described. 105

16. In a printing-press, essentially as herein described, the counter-shaft U, carrying the gearing between the bed and the anti-friction
110 sliders, in combination with the gears U' U² U³ and inking-rollers V, essentially as described.

17. In a printing-press, the combination of the bed having a rack secured to its under
115 side for imparting motion to a shaft (which is independent of the shaft for imparting motion to the bed) by a pinion engaging said rack, the said shaft having a gear connected to its outer end for imparting motion to the inking-rollers, substantially as described. 120

In testimony whereof witness my hand at the city of Chicago, State of Illinois, this 12th day of January, 1884.

ROBERT MIEHLE.

In presence of—

ROBERT BURNS,
GEO. F. DEXTER.