(No Model.) 6 Sheets—Sheet 1.

E. S. BRADFORD.

PLATE PRINTING MACHINE.

No. 518,134. Patented Apr. 10, 1894.

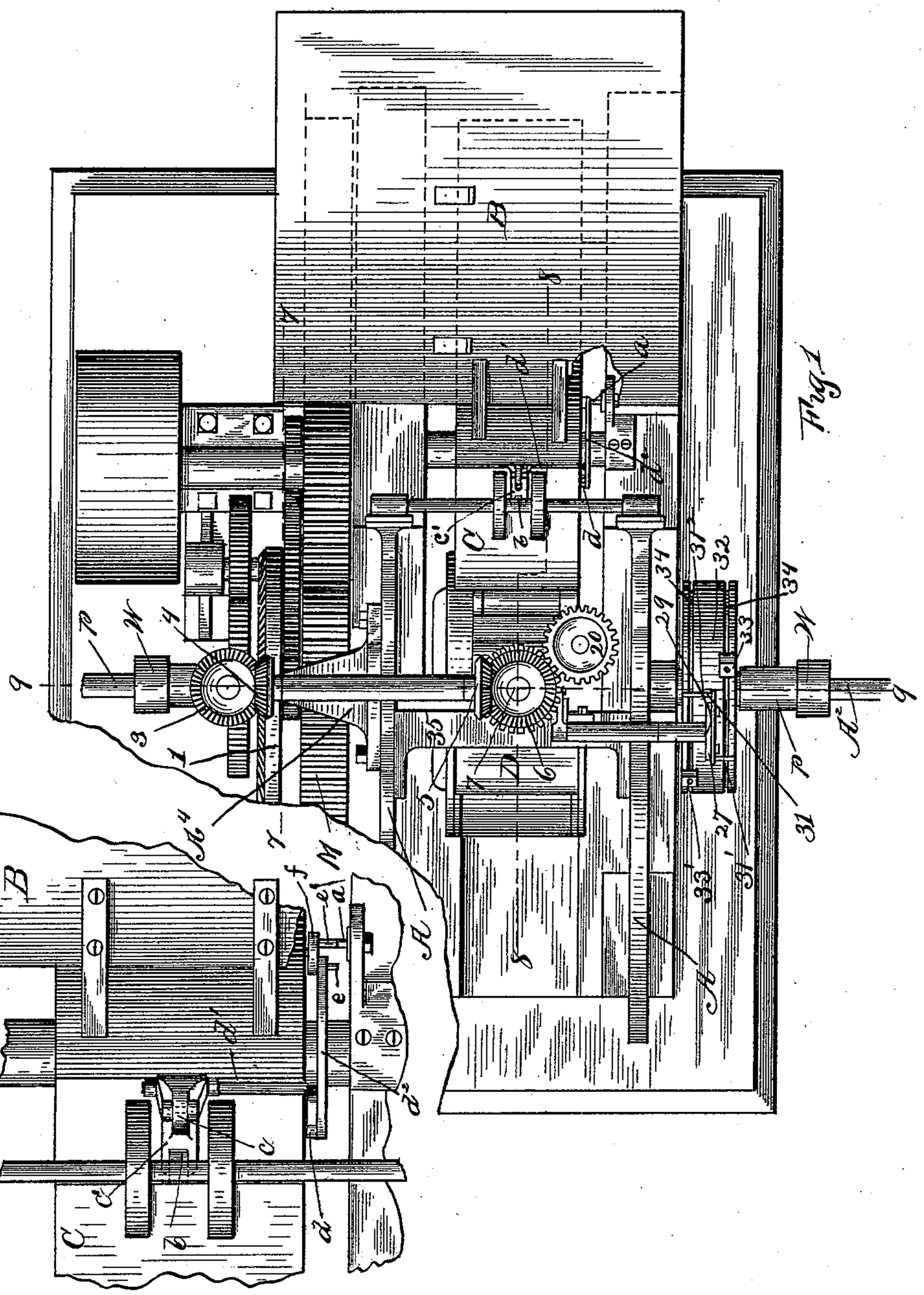

Fig. 1.

Fig. 16.

Witnesses.
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Eugene S. Bradford.
By Cobb & Thacher Attys.

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E. S. BRADFORD.

PLATE PRINTING MACHINE.

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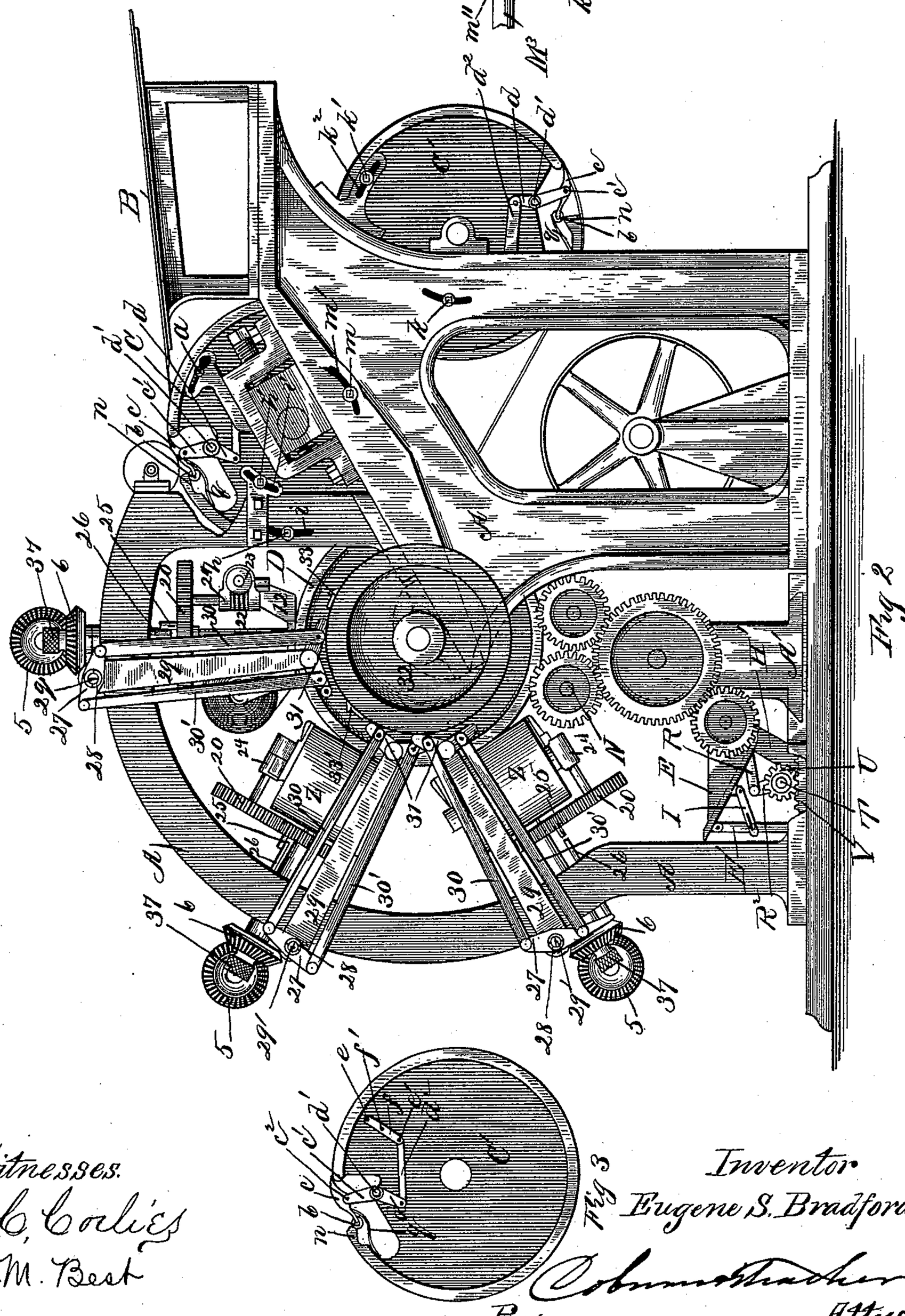

Fig 2

Fig 3

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E. S. BRADFORD.

PLATE PRINTING MACHINE.

No. 518,134. Patented Apr. 10, 1894.

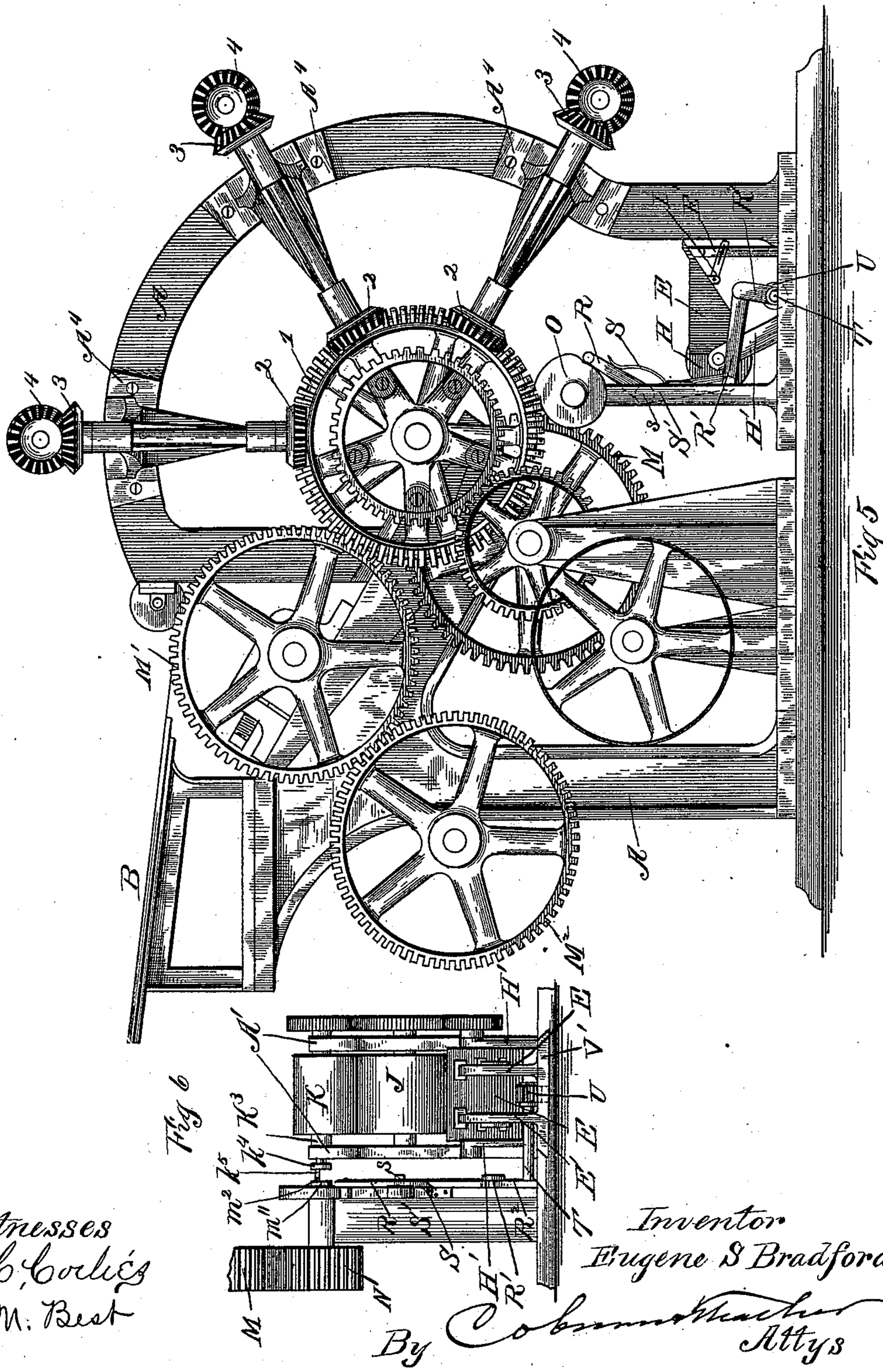

Fig 5

Fig 6

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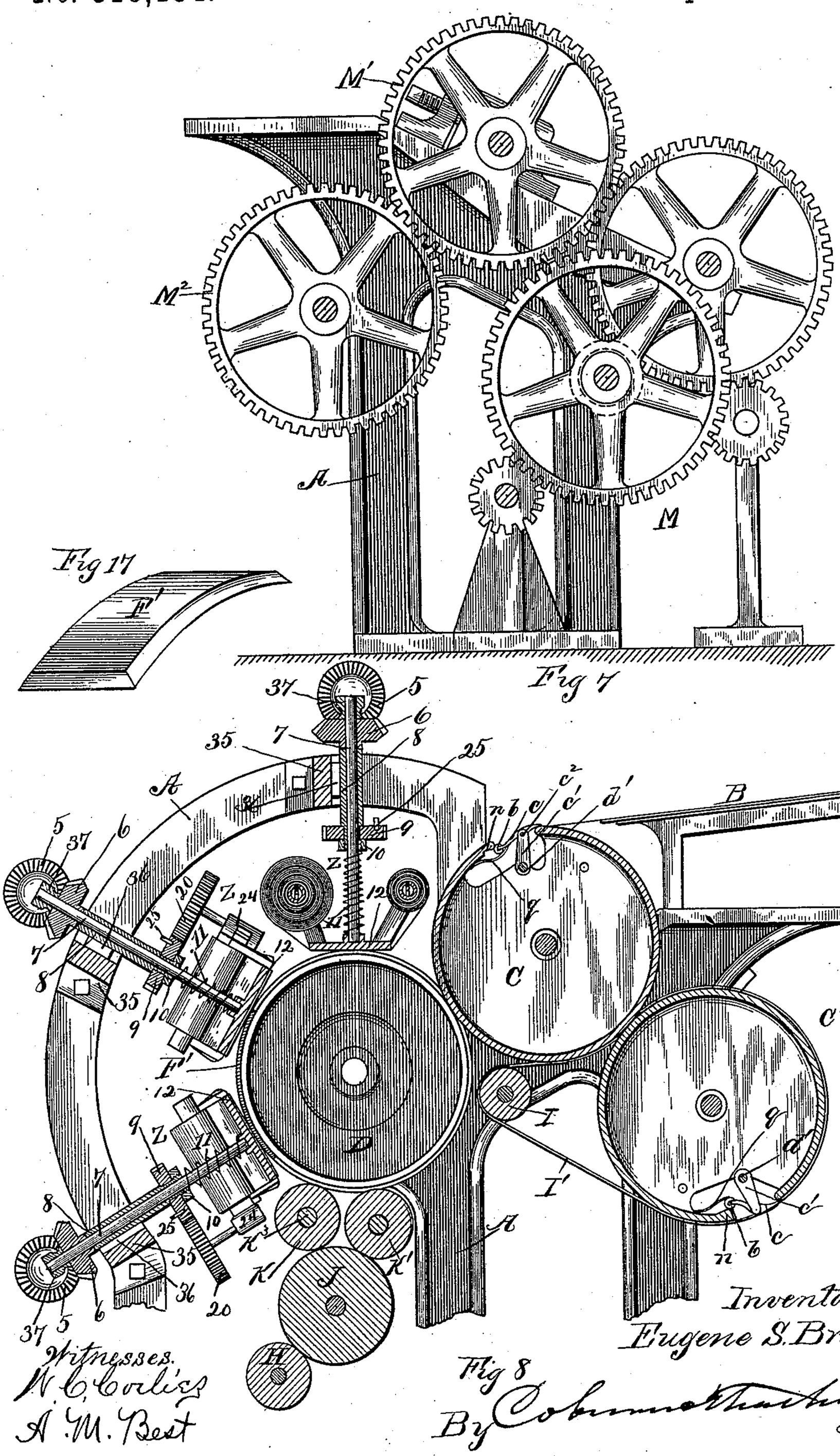
E. S. BRADFORD.

PLATE PRINTING MACHINE.

No. 518,134. Patented Apr. 10, 1894.



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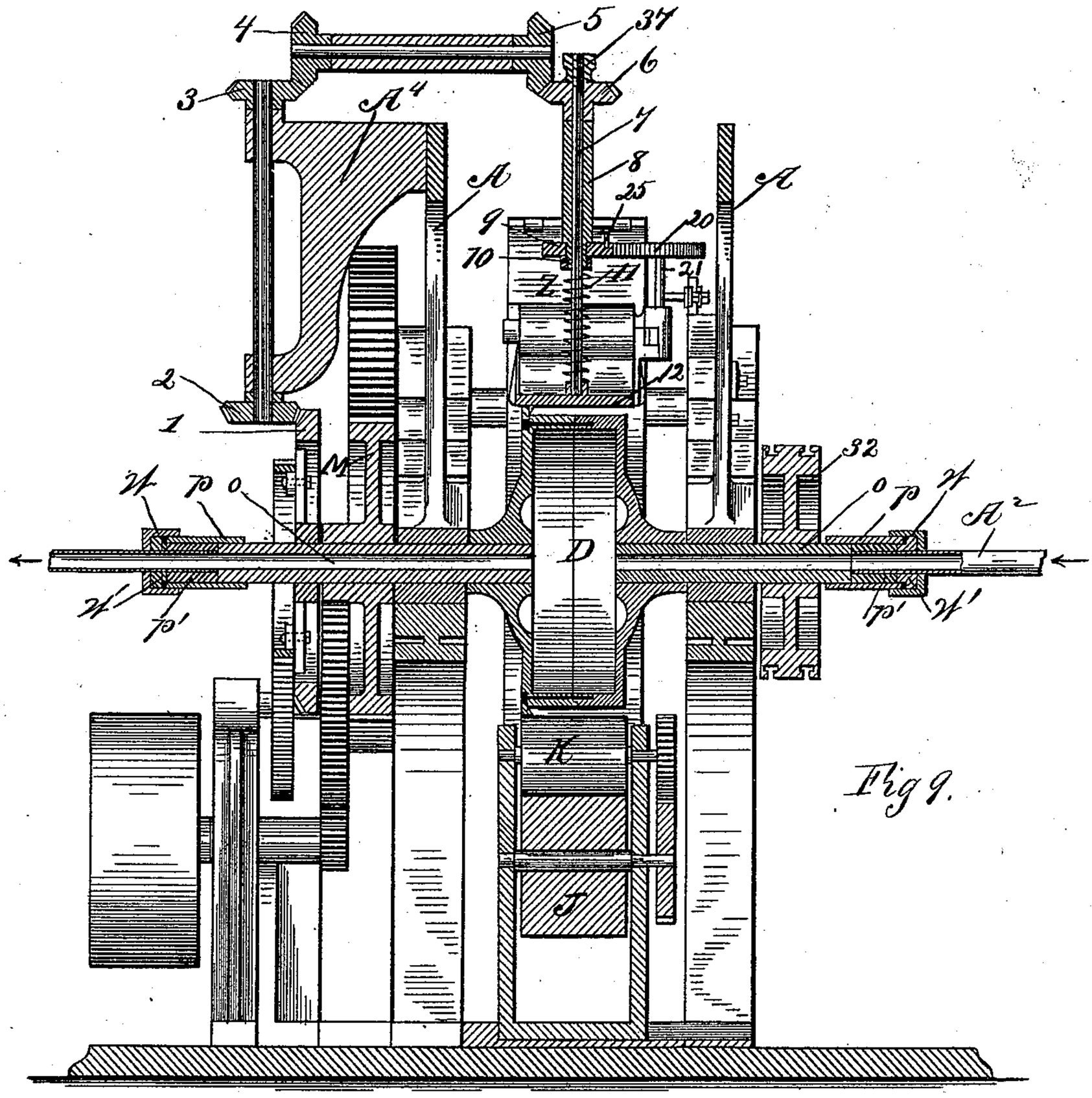

Fig 9.

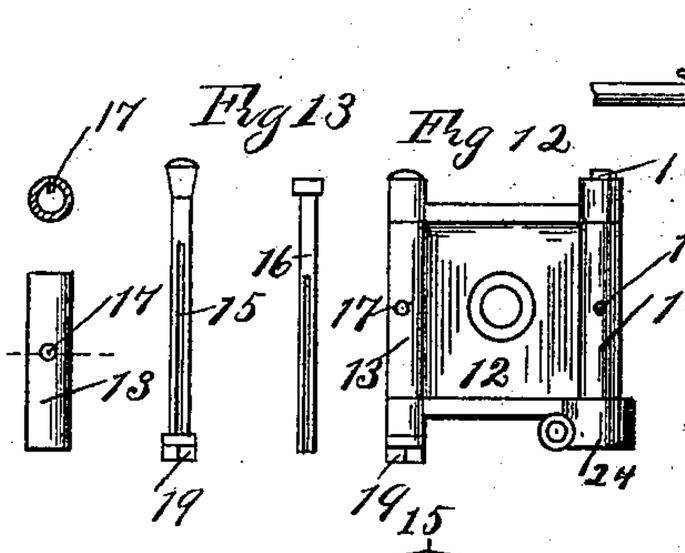

Fig 13. Fig 12. Fig 14.

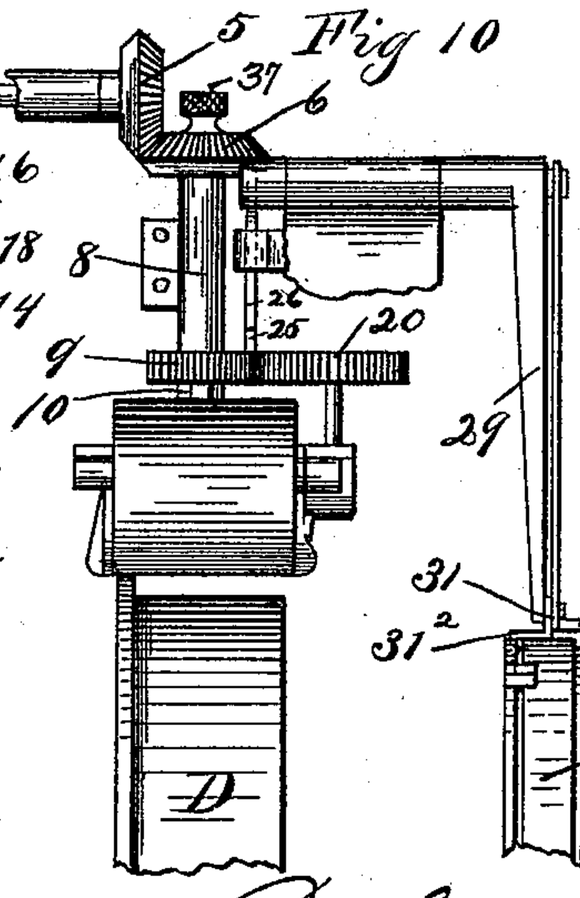

Fig 10.

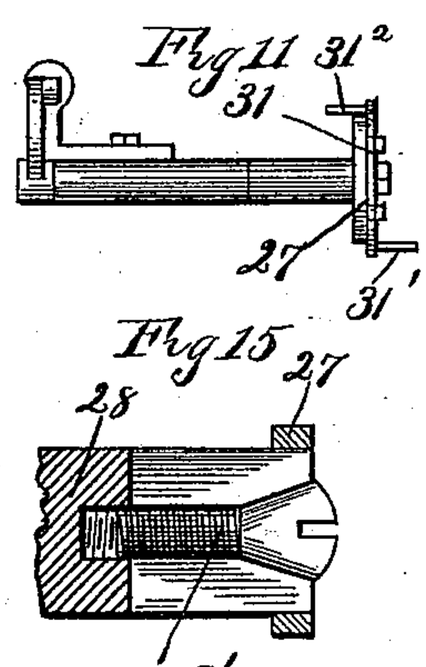

Fig 11. Fig 15.

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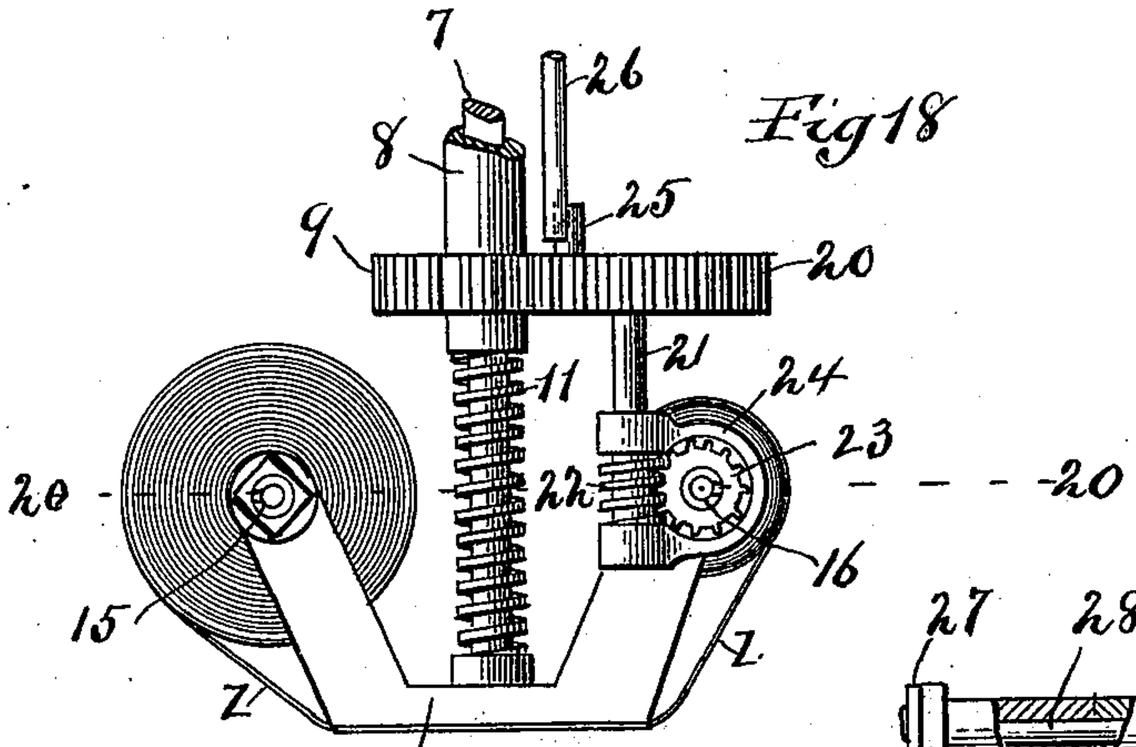
E. S. BRADFORD.

PLATE PRINTING MACHINE.

No. 518,134. Patented Apr. 10, 1894.

Fig 18



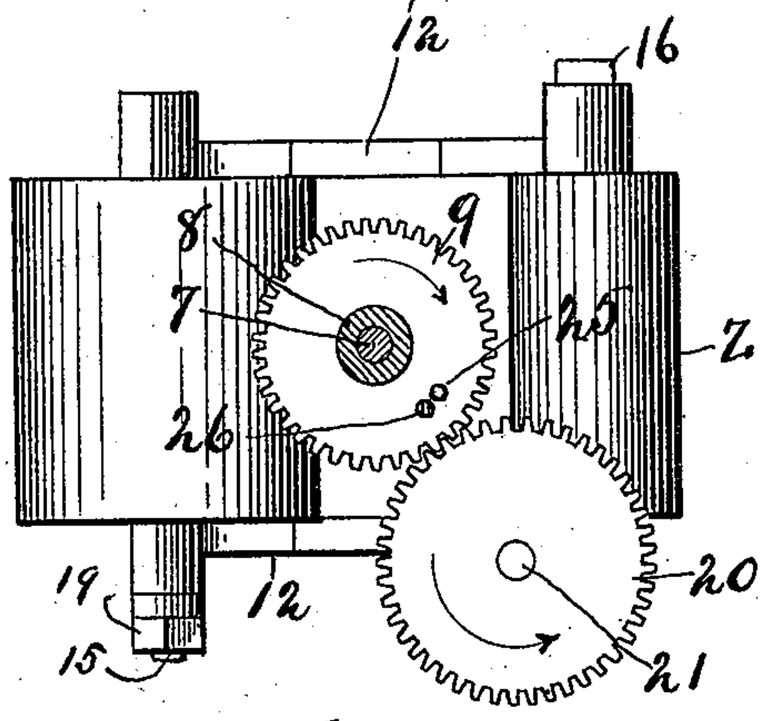
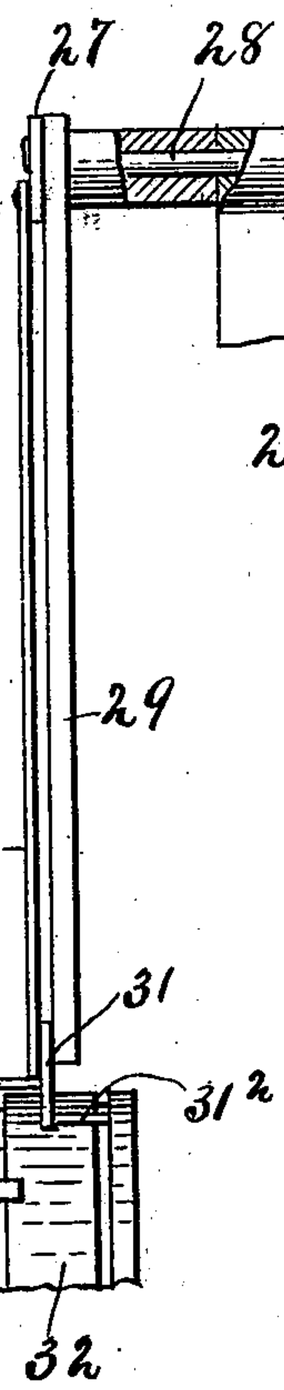


Fig 19



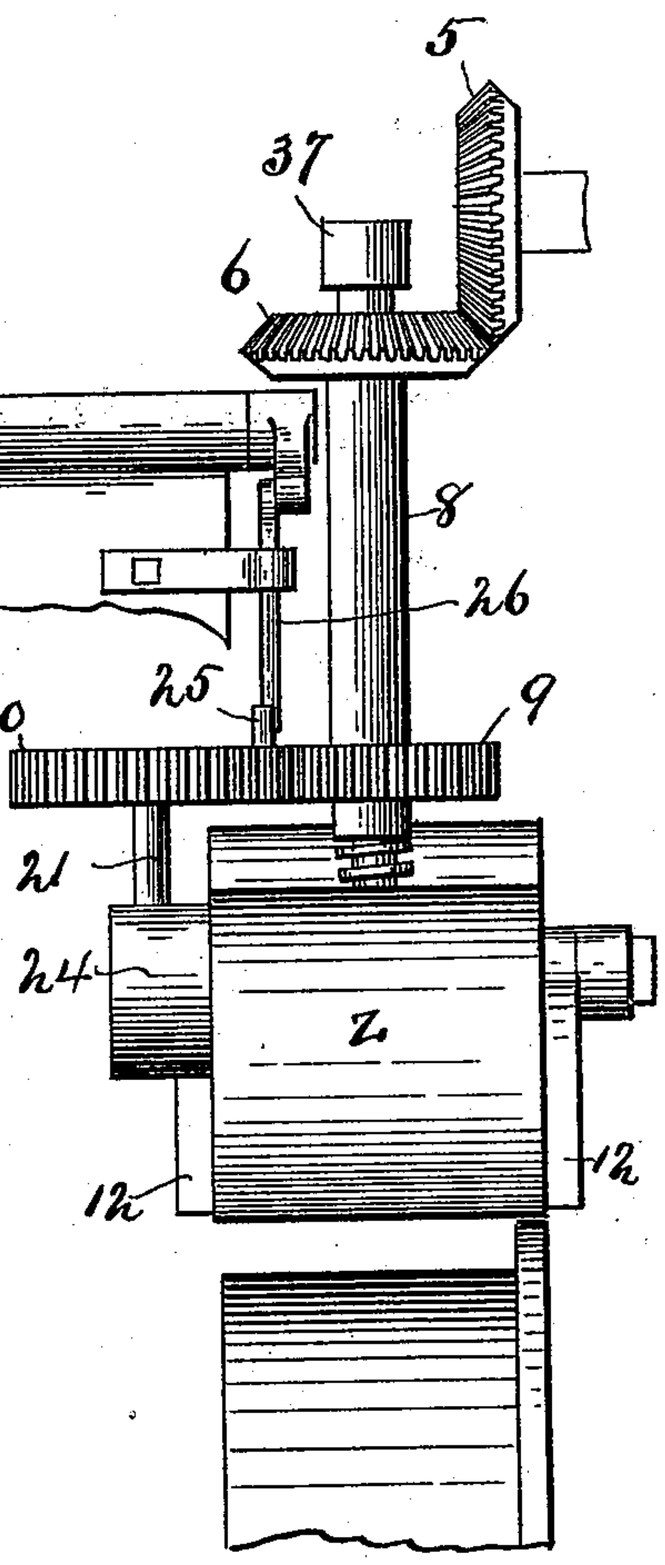


Fig 21

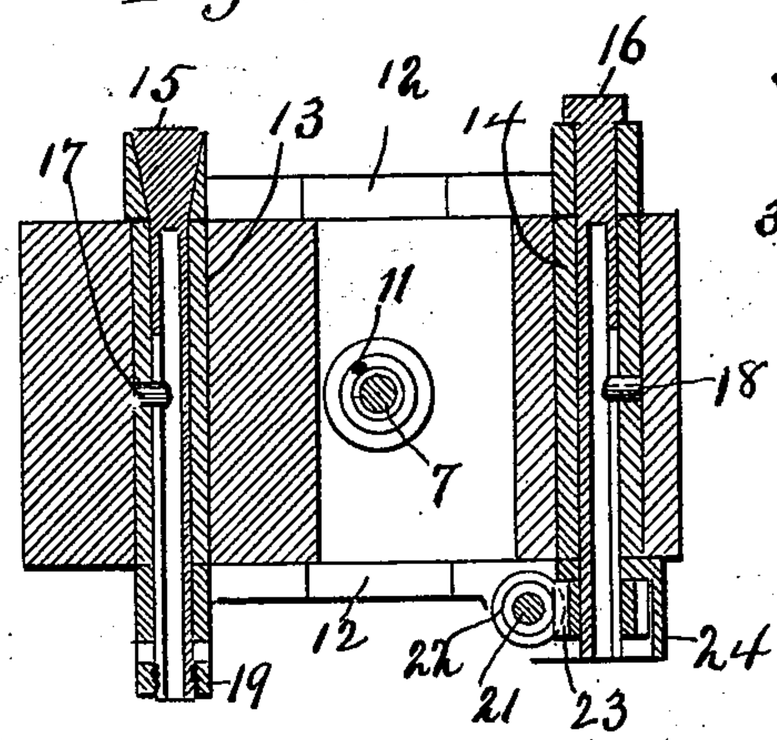


Fig 20

Witnesses
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THE NATIONAL LITHOGRAPHING COMPANY,
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UNITED STATES PATENT OFFICE.

EUGENE S. BRADFORD, OF CHICAGO, ASSIGNOR TO THE BRADFORD MACHINE COMPANY, OF EAST ST. LOUIS, ILLINOIS.

PLATE-PRINTING MACHINE.

SPECIFICATION forming part of Letters Patent No. 518,134, dated April 10, 1894.

Application filed October 13, 1890. Serial No. 368,026. (No model.)

To all whom it may concern:

Be it known that I, EUGENE S. BRADFORD, a citizen of the United States, residing at Chicago, in the county of Cook and State of Illinois, have invented a certain new and useful Improvement in Plate-Printing Machines, which is fully set forth in the following specification, reference being had to the accompanying drawings, in which—

Figure 1 is a top plan view of my machine, with one corner thereof broken away. Fig. 2 is a side elevation of my machine, showing a part of the frame cut away to show the impression cylinder and operating devices connected therewith. Fig. 3 is an end view of the impression cylinder. Fig. 4 is a detailed side elevation of the clutch for the ink rolls. Fig. 5 is a side elevation of my machine, showing the opposite side from that shown in Fig. 2. Fig. 6, is a detached side elevation of the ink fountain and the rollers and their attachments. Fig. 7, is a detailed side elevation of the machine, taken on the line 7—7, of Fig. 1. Fig. 8, is a vertical sectional view, taken on the line 8—8, Fig. 1. Fig. 9, is a transverse, sectional view, taken on the line 9—9, Fig. 1. Fig. 10, is a detailed side elevation of the mechanisms for operating the wiping ribbons. Fig. 11 is a detailed plan view of the upper part of the lever which operates the wiping ribbons. Fig. 12, is a plan view of the wiper frame upon which the wiping ribbon is mounted. Fig. 13, is a plan view of the pins for holding the ribbon spools on the wiper frame. Fig. 14, is an end elevation of the rock shaft which actuates the wiping mechanisms that wind the ribbon from one spool to the other spool, showing a portion of the vibrating lever secured thereon. Fig. 15, is a detailed section, taken on the line 15—15, of Fig. 14. Fig. 16, is a plan view of the gripping mechanisms which clamp and hold the paper on the impression cylinder. Fig. 17, is a perspective view of the engraved printing plate. Figs. 14 to 17 inclusive are on a somewhat enlarged scale as compared with the view shown in the other figures. Fig. 18 is a side elevation of the wiper-frame and its attaching devices. Fig. 19 is a top or plan view of the parts shown in Fig. 18. Fig. 20 is a transverse, sectional view, taken at the line 20—20, Fig. 18, looking down. Fig. 21 is a side elevation of the wiping-frame, and its operating devices, showing their connections.

My invention relates to improvements in plate printing presses, whereby the paper to be printed is more readily and accurately fed to the printing plates, and the printing plates more readily cleaned and inked, whereby I am enabled to print rapidly and with great distinctness.

My invention consists of the devices and combination of devices hereinafter fully described and made the special subject matter of the claims.

A, is the frame of the machine which supports the different parts thereof.

B, is the feeding-board from which the paper is fed to the impression cylinder, C.

C, is the impression cylinder which receives the paper and carries it to the printing cylinder, where it is printed.

D, is the printing cylinder on which the engraved plates, F′, are placed. The blank paper to be printed is placed upon the feed-board B, and as each sheet is moved forward, the fingers, *c*, which are pivoted within the impression cylinder C, clasp one edge of the blank sheet against the edge of the impression cylinder. The fingers *c* are centrally pivoted to a lever, *c′*, and carry on their rear ends a small roller, *b*, which passes back into a recess, *n*, when the lever *c′* is thrown back, which movement of the finger *c* releases the paper and also depresses the finger *c* within the impression cylinder below its circumference, so that it will not strike against the printing plates when the impression cylinder is revolved to bring the paper in contact with the printing plate to be printed. This movement of the finger *c* is accomplished by means of the lever *c′* to which the finger *c* is centrally pivoted, being rigidly secured to a shaft, *d′*, suitably journaled in the impression cylinder. There is also rigidly secured to the shaft *d′* a lever, *d*, at the lower end of which is pivoted a rod, d^2, to which is pivoted a lever, *f*, which lever carries two projecting pins, *e* and *e′*, and is centrally pivoted to the interior of the impression cylinder, at *f′*. There are also attached to the frame A, pins, *h*—*h′*, which are adjustable in the slot, *i*—*i′*. When

the impression cylinder C is in operation and the paper has been carried nearly to the point where it should come in contact with the printing cylinder D, the pin e' projecting from the lower end of the lever f, strikes the pin h', causing it to vibrate, and through the operation of the rod d^2 and the levers d and c' causes the finger c to be withdrawn from the periphery of the feeding cylinder C and moves the roll b back into the recess n, bringing the gripping end of the finger c within the circumference of the impression cylinder, where it remains until it has passed the printing cylinder D, and the printing or engraving has been accomplished at which time the pin e at the upper end of the lever f strikes the pin h which reverses the movement of the finger c and withdraws the roller b from the recess n and causes the finger c to again seize hold of the edge of the paper. There is a pin, m, adjustably secured within the slot, m', in the frame A. When the paper to be engraved has been carried around by the impression cylinder C and passes the printing cylinder D, it is desired to transfer it to the delivery cylinder, C'. At this point the pin e' attached to the lower part of the lever f strikes the pin m and withdraws the finger c from its hold upon the paper, moving the opposite ends of the finger c up into the recess n under the periphery of the impression cylinder C, as above stated. The paper then passes into contact with the delivery cylinder C', and at the same time, by the operation of the mechanisms secured to the delivery cylinder C', similar to the mechanisms above described which are within the impression cylinder C, the finger attached to the delivery cylinder C' seizes hold of the printed paper, and as the cylinder revolves, it is carried around to the position desired, where a pin, k', in a slot, k^2, strikes the mechanism connected with the finger c pivoted within the cylinder C', causing it to let go of the paper, when it is dropped into a suitable receptacle.

In Fig. 8 is shown a device for keeping one end of the printed paper from dragging, after it is released from the impression cylinder C, by means of the finger c being disengaged from it, and after the finger c in the delivery cylinder C' has seized it and before all the paper has passed into the delivery cylinder C'. This device consists of an idler pulley, I, suitably journaled in the frame A, and around which passes a tape, I', which passes over the impression cylinder C and around the idler pulley I, and from thence around the delivery cylinder C'. The cylinders C and C' are driven by gears, M', and M^2, respectively.

E, is an ink-fountain pivoted at one end to the post, E'. This fountain is shown as triangular in its form, having a bottom and two sides, its larger end being filled with the ink roll, H, journaled on arms, H', on each side of the ink roll. The ink fountain E is made adjustable with reference to its position to the roll H by means of a metal strap, I, pivoted at one end to an ear depending from the bottom of the tray near its center, and having the other end slotted and secured to the post, E', by a set-screw. The ink rolls are driven by the gear-wheel M that drives the printing cylinder D, so that the same uniform motion is given to the ink rolls as to the printing cylinder.

O, is a cam operated by the gear-wheel N, which meshes with the gear-wheel M. Against this cam O is pressed the bell-lever, R, pivoted on the post, S', at s. The lever R is held in contact with the cam by the spring, S, also secured to the post S', at one end, while the other end presses against the lever R. The lower end of the lever R is pivotally attached to the lever R'. The lever R' is pivoted to the lever R^2, while the lever R^2 is rigidly connected to a shaft or spindle, T, on the end of which is a pinion, U, which meshes with the rack-bar, V. The rack-bar V is rigidly secured to the frame V', which supports the ink roll H, and this frame is dove-tailed into the bottom of the frame A of the machine, so as to allow the frame supporting the ink roll H with the ink roll to move in and out of contact with the ink roll, J. The extent of this motion is regulated by means of the cam O, thus regulating the supply of ink to the remaining ink rolls. The ink rolls are journaled in the frame in the usual manner of such rolls, and motion is communicated to them by gear-wheels. The gear-wheel operating the roll H meshes into the gear operating the roll J, and that in turn meshes into both the gear wheels that operate the rolls K and K', the rolls K and K' being in contact with the printing plate F' on the printing cylinder D, each one receiving ink from the roll J, with which they are in contact, and the roll J receiving its ink from the roll H, which takes the ink from the ink fountain. The roll K is operated by a shaft, K^3, as shown in Fig. 4, at the end of which is a small disk, k^4. On this disk and near its circumference, is a pin, k^5. The gear wheel M turns a shaft, M^3, on the end of which is a small disk, m'', from which projects a pin, m^2, so arranged on the disk that when the wheel M is in motion, the pin m^2 will strike the pin k^5, thereby giving motion to the ink roll K. The object of this method of communicating power to the ink rolls, is to enable me to detach the ink rolls from the frame of the machine, whenever it is necessary, which cannot readily be done if the gearing of the ink rolls are connected in the ordinary manner with the remainder of the gearing in the machine.

The ink rolls K—K' and J are mounted on posts, A', of the machine. These posts are dove-tailed into the main frame of the machine, as shown in Fig. 2, so that the rolls and the posts can be readily removed without disturbing the remaining parts of the machine.

The printing cylinder is driven by the gear-wheel M. The circumference of the cylinder

is constructed so as to admit of the printing plates F′ being clamped to it in the usual manner. The circumference of the printing cylinder D, with the printing plates F′ added to it, is the same as the circumference of the gear wheel M, and the impression cylinder C is of the same circumference as the printing cylinder D with the printing plates added. The printing cylinder D is hollow, and is heated by steam introduced through the hollow shaft *o* from the steam pipe A^2, the steam filling the cylinder and passing through the shaft *o* and escaping.

An air-tight connection is made between the steam pipe A^2 and the shaft *o* in the following manner: The pipe A^2 is stationary and the cylinder and shaft *o* revolve on the end of the steam-pipe A^2; there is a sleeve, *p*, at the end of the shaft *o*, on the outer end of which is a screw-cap, W, the outer end of the sleeve being threaded, and the inner end of the screw-cap, so that the cap can be screwed tightly onto the sleeve. The top of the screw-cap W has a circular opening through which the pipe A^2 passes; the sleeve *p* revolves with the shaft *o;* there is a packing, *p′*, upon which, and between it and the top of the cap, there is a metal gland, W′, of the shape shown in Fig. 9. The object of this gland is to compress the packing when the cap is screwed onto the sleeve.

The printing plates, F′, are carried on the printing cylinder D, around to the wipers, Z, by which the surplus ink is wiped from them. There are three wipers shown in the drawings, but I do not limit myself to any particular number of wipers. These wipers are alike in construction, and are secured in bearings in suitable brackets secured to the main frame A, and they are driven from the shaft *o* by means of a beveled gear-wheel, 1, mounted on the shaft *o*, which meshes with the beveled wheel, 2, which turns a vertical shaft journaled in the bracket A^4 bolted to the frame A. At the other end of this shaft is a beveled gear-wheel, 3, which meshes with the beveled gear-wheel, 4, on the shaft journaled in the cross-piece also secured to the main frame. At the other end of this shaft is mounted a beveled gear-wheel, 5, which meshes with the beveled wheel, 6, that operates the shaft, 7, to the lower end of which is rigidly secured the wiper frame, 12, so as to rotate with the shaft. The beveled gear-wheel 6 is secured to the shaft 7 by a pin in the gear-wheel, which fits in a longitudinal groove in the shaft 7, by means of which the gear and shaft turn together and the shaft 7 can be vertically adjusted by means of a nut, 37.

8, is a sleeve surrounding the shaft 7, and is rigidly secured to the bracket, 36, which in turn is rigidly secured to the cross-piece, 35, of the main frame A. At the lower end of the sleeve 8, and mounted thereon, is a gear-wheel 9. The gear-wheel 9 is secured on the sleeve 8 by a nut, 10.

11, is a coiled spring on the shaft 7, the object of which is to regulate the pressure of the cloth on the printing plates F′, and keep the cloth and plates in contact. This spring 11 presses against the wiper frame at the one end, and against the sleeve 8 at the other, and the pressure of the spring is regulated by the nut, 37. By turning the nut 37, which is screw-threaded on the upper end of the shaft 7, in one direction, the shaft 7 is raised, thereby lifting the wiper-frame; by turning the nut in the opposite direction, the shaft 7 is lowered, the spring around the lower part of the shaft forcing the wiper-frame down, the spring always holding the wiper-frame down in position, but the length of the shaft below the sleeve through which it passes and in which it does not turn by reason of the spline and groove is adjusted by the nut 37.

The wiper frame 12 is made of metal and has four upright arms 12′ in which there are bearings for holding the spools 13 14 which carry the wiping cloth.

13, is a hollow spool containing the cloth which is used in wiping the printing plates, and from which, when the machine is in operation, the cloth is unwound and passed around under that part of the wiping frame in contact with the plate F′, and is wound upon the spool 14.

15 and 16 are pins, which are shown in Figs. 13 and 19. These pins are grooved for the purpose hereinafter stated, and are inserted through the spools 13 and 14, and have their bearings in the upright arms on the frame 12. The cloth is wound upon the spool 13, and the pin 15 is inserted through the spool, and is secured at one end by the head of the pin, and at the other end by the nut 19, the pin passing through bearings in the arms of the frame 12. The spools 13 and 14 are caused to revolve with the pins 15 and 16 by means of short pins, 17 and 18, which are passed through the spool, their ends projecting into the slots in the pins 15 and 16, causing the pins 15 and 16 to act as the axles of the spools. The gear-wheel 9, which is on the sleeve 8 of the wiper shaft 7, meshes with the gear-wheel 20, which is rigidly secured to the shaft, 21. There is also secured to the shaft 21, a worm, 22, which operates in turn a small gear-wheel, 23, that is secured on the pin that passes through spool 14, and serves as its axle. The lower end of the shaft 21, which carries the gear wheel 20 and the worm 22, has bearings in the boss, 24, which is rigidly secured to one of the upright arms of the wiper frame 12. When the gear-wheel 20 is revolved, the worm 22 turns the small gear-wheel 23, and thereby turns the spool 14 and winds the cloth upon it from the spool 13, thereby passing the cloth under the wiper frame 12, bringing fresh cloth beneath it to wipe the printing plate.

The cloth is not fed continuously but intermittently. To accomplish this intermittent feeding of the cloth from spool 13 to spool 14, I attach a pin, 25, on the gear-wheel

9, so that it will come in contact with a depending pin 26, which is pivoted to an arm, which projects at right angles from an oscillating shaft 28, on the end of which is secured a vibrating lever, 27. This pin 26 moves loosely through an ear attached to the frame, as clearly shown in Fig. 21, which serves as a guide to hold the pin in position as it is vibrated by the oscillation of shaft 28. The vibrating lever 27 is secured to the end of the shaft 28, as shown in Fig. 15, that is, the end to which the lever 27 is applied is split, so that the screw 29′, being screwed into the end of the shaft, will spread it and impinge it within the lever 27, which passes over the end of the rock-shaft 28. The rock-shaft 28 has a bearing in standard 29, which is rigidly secured to the frame A of the machine. At the lower end of this standard 29 there is pivoted a bent lever, 31, to which are pivoted the rods 30 and 31′, which are also pivoted to the vibrating lever 27, which is rigidly secured to the rock-shaft 28.

32, is a drum mounted on the shaft *o*, so as to revolve with it. This drum has on its periphery, lugs or projections, 33—33′, which are mounted in grooves on opposite sides of the periphery of the drum 32, but not in the same vertical plane. These lugs or projections serve to vibrate the bent lever 31, which is pivoted to the lower end of the standard 29, and through the instrumentality of the connecting rods, 30 and 30′, oscillate the rock-shaft 28, and bring the pin 26, which is attached to an arm on the rock-shaft 28, in contact with the pin 25 on the gear-wheel 9, and stops it, thereby causing the gear-wheel 20 by its revolution with the wiping frame to turn its shaft and turn the spool 14, winding the wiping cloth thereon, but when the rock-shaft is turned, disengaging the pins, the gear-wheel 9 being loose on the sleeve 8, it will not rotate the gear-wheel 20, and the spool 14 will not turn on its axis till the pins again come in contact. The revolution of the wiper frame with the cloth, and the motion of the printing cylinder carrying the printing plates beneath the wiper frame and cloth, gives two motions of contact between the wiper cloth and the printing cylinder, thereby completely wiping the ink from certain parts of the printing plate, which is caused largely by the ability of the wiper plate shaft having a vertical sliding or yielding motion, regulated by a spring by which the pressure of the wiping cloth upon the printing plate can be varied, in such way that I am able to do very superior work in my plate printing press.

Having fully described the construction and operation of my invention, what I claim, and desire to secure by Letters Patent, is—

1. The combination in a rotary printing press, of an impression cylinder a centrally pivoted gripper finger pivoted to a vibrating arm, one end of said finger projecting through the periphery of the cylinder to grip the paper against the cylinder, the other end moving in a guide-slot within the cylinder to cause the gripping-finger to hold the paper when the arm to which the finger is pivoted is thrown into a certain position, and to recede within the cylinder when thrown in another position; the vibrating arm to which the gripping finger is pivoted vibrating within the cylinder; and suitable mechanism connected to said vibrating arms and operated by the pins or lugs on the frame outside of the cylinder to vibrate it at fixed, definite periods by the revolution of the cylinder, substantially as specified.

2. In a plate printing press, the wiper frame 12 having arms upon which are mounted rolls for carrying the wiper cloth which revolve with the wiper plate; and gear wheels and shaft carried on the wiper frame and rotating one of the spools which are mounted on the wiper frame and a shaft on which the wiper frame is mounted, whereby the wiper frame and cloth are rotated, and the cloth fed from one spool to the other, substantially as specified.

3. The combination with a wiper frame of a plate printing press, mounted on the end of a revolving shaft; of the driving mechanisms mounted on the wiper frame for winding the cloth from one spool to another on the wiper frame; of a rock-shaft connected with a drum on the shaft of the machine, and means intermediate said shaft and the gearing which feeds the cloth to feed it intermittently beneath the wiper frame, as specified.

4. In a plate printing press, the wiper-frame; spools mounted on said frame and revolving therewith to carry the wiper-cloth; the shaft 7 to which the wiper-frame is attached; a sleeve surrounding said shaft and through which the shaft is adjustable vertically, but which revolves with the shaft; a spring between the sleeve and the wiper-frame; and means for adjusting the shaft through the sleeve, substantially as specified.

EUGENE S. BRADFORD.

Witnesses:
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A. HELMICH.